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THESIS

Localization and Decentralization of Defense Industries In the United States

by

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INTRODUCTION

As a result of the increased effects of the present defense program, which either directly or indirectly affects every individual, industrial decentralization is rapidly assuming greater importance as a fixed policy for the United States. Increased developments in military aviation, coupled with recent developments in the present world crisis, have brought the problem of industrial production for military defense into the foreground as an established part of our rearmament program.

This new phase of industrial development has received comparatively little attention in the past century, and though numerous proponents of decentralization have advocated its development on economic and social grounds, their theories have been dwarfed by the importantance of national defense.

Comparatively little research has been done on the subject of decentralization, particularly as it applies to defense, because it is a new and potential problem which threatens to overshadow all arguments previously expounded in its favor.

In this treatise of the subject an attempt has been made to briefly review the causes of centralized industry and recent factors which have tended to encourage and retard decentralization. An analysis of present industrial location discloses the degree of concentration within the various geographical areas of the nation, and the military difficulties which are experienced in the defense of these vital areas have been enumerated.

An investigation into the extent of decentralization within

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the country and a detailed review of present government plans and policies endeavor to show the extent and importance which decentralization can be expected to assume and how it may tend to affect the social and economic trends within the country.

This manuscript does not exhaust the subject of decentralization but merely serves as the starting point in what could easily be an extensive study covering a more detailed analysis of every subject mentioned.

If this brief survey serves to awaken in the reader the recognition and importance of this subject and the tremendous effects which it may have on our country and our way of life, it may be said to have accomplished its purpose as a small contribution to the social, economic, and industrial problems of national defense.

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The Increased Importance of Industry in Defense

The realization by the American people that our national security is in danger and that the grim tragedy of war may soon be a reality makes us face the necessity of rearmament on a vast undreamed-of scale. We find that our industrial system has been challenged in a vital race against time, and though we are a nation with a tremendous industrial capacity, plans are formulating for new peaks in defense production in the very near future.

The tempo of modern war, as well as its changes and developments to new and scientific methods, has created new problems from the industrial point of view. The military problem has become an industrial problem, and the strength of a nation's armed forces is limited by the maximum utilization of the available natural resources, by industry, within the shortest time possible.

The needs of a mechanized army are divided into two classes; namely, mobility supplies and war equipment supplies. The mobility supplies are those which insure the movement of men and consist of water, food, and fuel, while the war equipment supplies are those which equip or assist men and machines for battle; namely, ammunition, spare parts, gasoline and lubricants.

The vital part which industry plays in modern war is to supply the army with these materials in sufficient quantities when they are needed." It is estimated by Colonel G. C. Shaw in his book Supply in Modern War that a mechanized brigade of two thousand three hundred and forty-six men requires the following per day:**

*See Appendix A, B, C,
**Shaw, Colonel G. C., Supply in Modern War, Faber & Faber, 1939

Mobility Supplies	
Water, Food, Fuel	81 Tons
Gasoline and Oil (1.84 tons per mile)	76 Tons
War Equipment Supplies	
Ammunition	140 Tons
Railroad Trains to Move Brigade	14
Ship Tons for Overseas	25,000

If the United States is to train and equip an army of four million men, the tremendous task of furnishing them according to the above figures would reach staggering totals.

Food, Water	138,000 Tons
Gasoline and Oil	129,580 Tons
Ammunition	238,700 Tons

In addition to the above requirements, the nation must furnish the navy and the airforce with the necessary equipment and supplies and meet the normal needs of the civilian population.

During the first World War the United States required six men in factories for every soldier in the field while today it is estimated that Germany is using eighteen men in industry for each soldier.* This startling comparison serves to illustrate the increased importance of industry in modern warfare and substantiates the theory that the outcome of wars may not be determined solely by the soldier but by industry. In order to insure victory the modern army must be equipped with hundreds of articles of every description, and its supplies must continue to flow from the factories to the battlefield in a never-ending stream.**

The introduction and importance of aerial bombardment of the nation's vital supply areas brings to us the important problem of

* Popular Science Monthly, November, 1940, p. 82

** See Appendix A, B, C

maintaining industrial production under war conditions at maximum capacity. It is argued that the acquisition of Western-hemisphere air bases and the construction of a two-ocean navy will be sufficient to protect our shores from any foreign invader. The validity of this theory cannot be denied, but we are moving in a changing world. Things which were thought impossible have happened, and a bombardment of our industrial areas in the future is possible. If ours is to be a complete defense, all the possibilities must be taken into consideration to prevent chaos or defeat in a national emergency.

The localization of industry in the United States creates a defense problem which will require a great deal of planning and some intelligent action. Military authorities recognize that the vulnerability of important industrial areas, particularly to air attack, increases daily. Bombers are now being designed and constructed which can fly across the ocean and back without refueling, and it is admitted that the complete protection of a given area is not always possible. The importance of industry in war has been demonstrated and the mobilization of manpower alone is not sufficient to insure complete defense. The mechanization of modern armies is complete, only so long as industrial production keeps the army supplied with its mechanical appliances, supplies, and food.

Factors Influencing Industrial Location

The location of industry cannot be said to be haphazard. As a general rule, industry has economic reasons for its location; and even if a superficial examination shows an uneconomic location, one will usually find that some important economic factor had some influence in the choice of location. Changing economic conditions sometimes make

it appear desirable for an industry to move, but although change is constant, sometimes the economic advantages to be gained in relocation cannot be justified by the expense involved in transferring operations.

The development of the Atlantic seaboard from an industrial point of view was a natural result of colonization. The ocean was the most convenient means of transportation, and naturally, people settled wherever it was convenient and economical. With the increase in population there were developments in transportation and communication, and the mill or factory gradually began to take the place of the home craftsman. The location of these industries was determined primarily by the power factor, and many modern factories still operate on the sites once occupied by small mills. With the introduction of steam power and the greater developments in transportation the movement of industry began. Many regard this movement as decentralization, but it is not what is regarded as strictly decentralization from the defense viewpoint.

Industry expanded over a wide area, but certain industries tended to localize. If raw materials were the economic factor which determined the choice of location, then all industries interested in the important factor moved in its direction and the entire industry was located within a relatively small space or localized. Many industries once they are located have remained near the source of raw material long after the supply has been exhausted.

The principal causes of the localization of industry are not numerous, and though industry locates principally for one reason, other factors may soon become prominent so that the original reason for a location is superseded by some other which was of less importance. Industry has a tendency to locate near other like industries within local geographic

areas even though it might seem that it would be more advantageous to locate in some area where there is less concentration of similar industries. Examples of this tendency can be seen within our own city by noting the location of the wholesale shoe district, jewelers, lawyers, automobile dealers, hotels, and hundreds of businesses which group together.

Many industries have found it important to locate near seaports because it was most economical to do so. If it is advantageous for a business to use ocean transportation or if it finds that it imports its raw material and exports its finished product, the location near the means of transportation is found to be convenient. In some cases, such as the shipbuilding industry, it is impossible to locate in any other location, although even here there have been cases where ships were constructed inland in sections and then transported overland and assembled on the coast.

The nearness of the market which is supplied has many times influenced the location of a particular industry. As population moves westward some industries tend to follow, particularly if transportation costs of the finished product are fairly high. A striking example of the tendency may be given by citing the manufacture of agricultural machinery. We find that New England was the agricultural center of the country, and Massachusetts and Connecticut were the locations principally chosen by manufacturers of farm machinery. Today, the leading agricultural machinery factories are located at Chicago and St. Louis where they are in the center of their market; namely, the farm states of the country.

Perhaps the most important factor determining the choice of location of industry is the power supply. Although its importance has decreased in many industries because of cheap electric power, efficient steam plants, and Diesel engines, its importance in many industries

continues to be a determining factor. If we travel thoughout New England we can still see the importance of water power as a prime mover of industrial machinery. Our cotton mills, paper mills, and many small factories take advantage of the many rivers and streams although they have auxiliary steam plants or use purchased power when the principal available source fails or is insufficient for peak production. Water power is still one of the most economical forms of power available, and its importance is increased through government construction of dams for flood control, irrigation, and navigation. The water power itself may not have value, for many firms, but the hydro-electric power produced at economical rates is a favorable attraction. Examples of power as a contributing factor in the location of industry is the Alcoa plant near the Tennessee Valley Authority power dam and the proposed aluminum plant to be constructed at Massena, Vermont, if the St. Lawrence waterway project is approved and a power station is built.

Although coal and oil are today important sources of power, modern methods of transportation have made the location of the industry using it unimportant from the viewpoint of the power source. The use of electric furnaces in the steel industry, however, may eventually have some affect on the use of coal as a source of power for that industry, but it is doubtful whether it will achieve much importance, because hydro-electric power seems more economical for electric smelting, at the present time, than steam-generated power.

The lack of transportation facilities and communications may have determined the location of industry in the past, but this no longer is true. We find that motor trucks travelling over well-constructed roads can penetrate into every corner of the country and in combination

with the railroads give fast and economical transportation. It seems that the only limits placed upon the quantity or size of merchandise which can be transported are the state laws regulating the weight which may be carried on each axle. If it were possible to operate larger and heavier trucks on our highways, the manufacturers are in a position to build them. It can be readily seen that at least one factor governing the location of industry has been for practical purposes eliminated.

A very important part in the location of industry has been determined by natural resources. The greatest example of this type of location is the steel industry. The importance of coal, limestone, and ore has encouraged the industry to concentrate where these raw materials are in abundance. It is true that iron ore can be carried economically long distances, but the amount of coal used per ton of ore does not make it quite so profitable to transport the coal so the most economical method has been selected, namely, that of bringing the least expensive to the one which would necessarily entail a higher cost.

Local investments and local prestige have been important in industrial location. People who invested money liked to place it in local enterprises where it could be watched. Today, with large capital investments made through stock exchanges and spread over many industries and localities, the importance of local investments has diminished. People no longer invest their capital locally but place it where they believe they can secure maximum yield at a minimum risk, and the "personal touch" which people desired in their investments no longer exists. Local prestige still is somewhat of importance - a jewelry concern still likes to locate in Attleboro, Providence or New York because those are known to be the jewelry manufacturing centers of the country. It makes

a firm seem important if it locates where other similar firms are located.

An important factor in the location of industry has been the topography of the soil and the climate. These two geographical characteristics are important primarily in the moving picture industry. In the case of other types of industry they are no longer of paramount importance, as technological improvements in lighting, air conditioning, and the use of electric power have practically displaced the industrial benefits which could be secured by locating on a hillside beside a river, or in a location where there is a damp climate or more sunshine per year than any other locality.

The most recent and perhaps most important factors governing the location of industry in recent years have been division of manufacture and an abundant labor supply. Although specialization in the division of manufacturing processes and modern machines has decreased the quantity of skilled artisans, we find that many industries have had to locate where skilled labor was abundant. The machine has released the importance of labor in many industries by performing many intricate and involved operations, and mass production and the division of labor has permitted the use of less skilled labor. In the opposite direction we find that complicated machinery needs a highly trained and skilled worker to construct and operate the machines; thus, industries locate where the type of worker they require can be more readily found.

The division of manufacturing into specialized units and the utilization of by-products have a great influence on industry. Many small industries supply materials for some large industry. as, for example, the automobile industry at Detroit. There we find hundreds of small factories.

making nuts, bolts, small parts, instruments, etc., to be used by the larger manufacturers in making their automobiles. Many industries have scrap. waste or by-products which attract industries to reprocess or convert the scrap into usable products. There are many instances where a by-product industry may become more important than the many industries which supply its raw materials.

Industrial Concentration in the United States

Recognizing that certain economic factors have influenced the location of industry it is logical to turn our attention to an analysis of the manufacturing facilities which exist within the nation. Except for the East North Central area, we find that there is a high concentration along the coast line which is very susceptible to both air and sea operations. This vulnerability of industrial areas to modern methods of attack causes a great deal of uneasiness in the minds of both military and industrial leaders because a large portion of the nation's industrial capacity can be paralyzed with a few effective attacks by a potential enemy. The destruction or control of one vital industry or the disruption of production of some essential material may jeopardize or result in the complete collapse of our entire defensive (or offensive) military plans. The proximity of New England to Europe places it in a highly dangerous position because it can be attacked simultaneously by sea and by aircraft operating from Canadian bases as well as land forces which might successfully invade Canada in the remote future.

An analysis of population distribution, wage earners, wages and value of products produced serves as the most effective barometer

of industrial capacity within specified areas. The following figures are based on the 1930 census of 122,775,046 population and the 1935 census of manufactures.

Geographical Distribution of Population, Wage Jobs, Wages and Value of Products (1)(2)

Section	Percentage Distribution of Population (1930)	Percentage of Wage Earners (1935)	Wages* (1935)	Value of Products* (1935)
The North	59.5	74.4	5,754	34,600
New England	56.7	12.3	894	3,900
Middle Atlantic	21.4	28.6	2,200	12,800
East North Central	20.6	28.6	2,400	14,500
West North Central	10.8	4.9	360	3,400
The South	30.8	19.6	1,072	7,500
South Atlantic	12.8	11.6	650	4,100
East South Central	8.1	4.3	234	1,500
West South Central	9.9	3.7	188	1,900
The West	9.7	6.0	475	3,500
Mountain	3.0	0.9	75	600
Pacific	6.7	5.1	400	2,900
East of the Mississippi	69.6	85.4	6,378	36,800
West of the Mississippi	30.4	14.6	1,023	8,800

*In Millions of Dollars

A summary** of the previous figures shows that within 14% of the nation's total area 69.5% of the nation's wage earners are located, and 66% of the nation's manufacturing value is produced. Seven states, namely, New York, Pennsylvania, Ohio, Illinois, Massachusetts, Michigan, and New Jersey have 57% of the wage jobs or 4,217,700 wage earners (1935 figures) and 74% of the total wage bill of the nation.

** Woods, Ralph M., America Reborn (1939), p. 74

(1) See Appendix D

(2) (Population percentage) McKenzie, Roderick D., The Metropolitan Community (New York, 1933)

(Figures of Percentage of Wage Earners, Wages, Value of Products) America Reborn, by Ralph M. Woods. (1939) p. 53.

Within this limited area in 1933 the following percentages of national production existed within certain industries: (1)

Printing and Publishing	68.2 IV	Iron and Steel	84.8 I
Woolens and Worsteds	93.2 IV	Hardware	96.0 I
Electrical Machinery	94.4 III	Boots and Shoes	82.1 IV
Motor Vehicles	90.1 I	Meat Packing	52.4 I
Clothing	78.0 IV	Cigars - Cigarettes	58.5 IV
Chemicals and allied products	62.9 I or IV		
Engines and Turbines	86.9 I or III		

(Roman numerals indicate importance in defense)

This concentration may not be strictly regarded as critical from a military point of view because it can be argued that the above list does not include all the industries which are essential to national defense and it includes "luxury" industries which would not affect the nation's military strength. It must be further recognized that the figures are for "peacetime" production and they naturally do not include government arsenals and shipyards which were, at that time, very far from operation on a twenty-four hour basis. Any figures or statistics must be regarded as indicators of trends and conditions, and it must be recognized that at full operation on a war basis there might be startling changes in statistical summaries. We must recognize that for the production of war equipment and supplies the nation must rely on the areas where productive facilities exist and any changes under war production would tend to show a greater concentration of essential industries within the areas as manufacturers change their plants from "peacetime" production to war supplies.

By a further examination of the preceding table of Class I industries (those most vital to defense) a more alarming situation is discovered. In the twelve industrial divisions listed at least six

(1) See Appendix E

industries may be classified as Class I and these represent at least 50% of the nation's production within the limited area of seven states. Every other industry listed has some bearing in national defense (see list in Appendix A) which must not be disregarded, and each one's percentage of production exceeds 50% of the nation's capacity for the industry. (There is a difficulty in comparing the above table to the industrial classifications of the War Industries Board of the last war because census statistics are not summarized in detail according to classifications of the Board and many Class I industries are not reported in detail or they are included in some general classification which cannot be analyzed as completely as desired.)

Parallel with the problem of industrial concentration, we find that a similar condition exists when we study the density of population. People representing manpower, economic wealth, and productive capacity congregate in those areas where the economic resources and development are most abundant. Where one finds industry one also finds people, and the two are so interdependent on each other that they make our military as well as industrial problems more acute and our plans more complicated. One half of the population of the United States lives in Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Maryland, Delaware, Ohio, Indiana, Illinois, Wisconsin, Michigan and the District of Columbia. The extent of concentration can be recognized by noting that in an area comprising 4% of the nation's area 27% of the population is located. The population per square mile in this area is as follows:*

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*Woods, Ralph L., America Reborn (New York), page 52; based on United States Population Census - 1930.

Rhode Island	644.3
New Jersey	537.8
Massachusetts	528.6
Connecticut	333.4
New York	262.4
Pennsylvania	214.8
Average for above	148
Nation as a whole	41

Thus we find that both the concentration and interdependence of industry and population create similar problems which are interrelated because without industry modern military campaigns cannot be carried on and mobilization implies the complete utilization of all economic resources toward a definite goal. The concentration of population has been one of the most important factors in determining the localization of industry and it creates the greatest problem when we focus our attention on the problems of decentralization.

A duplication of the localization which exists in the geographical areas of the country often can be found to exist within each of the geographical areas. One often finds that the bulk of the manufacturing facilities of a particular industry is located within a comparatively small radius, and this centralization is carried out in greater detail when one analyzes the plant locations within the confines of states and finds that a major portion of each particular industry is mainly located within one city.

For representative examples of such centralization, five industries have been selected for analysis to show the centralization which exists within areas and these have been further analyzed, insofar as possible, to give representative examples of localization within the state. For obvious reasons it is impossible to determine the size or productive capacity of the plants within the industry, but the illustrations

of concentration must be regarded as a dangerous condition no matter how large the size of the plants or the quantity of their productive capacity. (It must be noted that the production figures do not represent maximum capacity; however, they are taken from the 1937 census, which is considered to be a normal year representing the recovery phase of the business cycle.) (Later figures are not yet available at this time)

For purposes of this regional analysis the following Class I industries (vital to national defense) are analyzed in somewhat greater detail: petroleum, aircraft, steel works and rolling mills, firearms, and machine-tool industries. The tables* for these five industries illustrate that within a specified geographical area, one or two states often contain the greater portion of the industry.

Petroleum	No. of Firms	Value of Products
United States	365	$2,546,745,730
Arkansas	5	14,383,526
California	57	356,097,585
Illinois	11	115,545,654
Indiana	6	190,332,763
Kansas	18	102,490,429
Kentucky	7	20,954,056
Louisiana	12	122,151,945
Michigan	9	21,999,689
Montana	16	10,892,921
New Jersey	8	216,284,099
New Mexico	7	3,431,417
New York	7	46,009,784
Ohio	13	97,297,783
Oklahoma	30	144,474,915
Pennsylvania	33	259,626,775
Texas	79	689,625,304
West Virginia	3	11,607,874
Wyoming	22	29,993,494
Other States	22	93,475,713

Steel Work and Rolling Mill Products	No. of Firms	Value of Products
United States	410	$3,330,491,150
California	19	38,276,772
Illinois	37	287,207,667
Indiana	18	356,646,436
Michigan	20	130,888,132
Missouri	8	21,727,059
New Jersey	12	42,758,066
New York	22	157,809,733
Ohio	64	733,351,272
Oregon	3	1,787,641
Pennsylvania	131	1,109,843,163
Washington	5	4,780,818
West Virginia	8	93,053,845
Wisconsin	12	21,860,979
Other States	51	330,499,567

*United States Census of Manufactures - 1937

__ States underlined further analyzed as to industrial location

Firearms

	No. of Firms	Value of Products
United States	21	$ 21,554,870
Connecticut	7	11,857,653
Massachusetts	4	3,634,372
New York	5	5,829,552
Other States	5	233,293

Aircraft

	No. of Firms	Value of Products
United States	92	$106,568,000
California	24	51,863,046
Indiana	3	33,735
Kansas	5	2,415,776
Missouri	5	870,355
New York	17	15,515,923
Ohio	13	2,137,710
Pennsylvania	7	2,002,890
Other States	18	31,729,019

Machine-Tool Industries

	No. of Firms	Value of Products
United States		
California	5	$ 120,567
Connecticut	24	29,115,574
Illinois	35	26,778,179
Indiana	11	7,414,004
Massachusetts	26	22,227,818
Michigan	24	12,144,451
Minnesota	5	458,592
Missouri	5	1,019,154
New Jersey	8	1,979,684
New York	18	14,145,180
Ohio	69	80,111,824
Pennsylvania	23	15,504,489
Vermont	5	10,100,455
Wisconsin	21	12,645,401
Other States	13	26,477,446

A further analysis of one or two of these states shows the concentration to be carried out still further when one consults the national business directories.*

Petroleum

Kansas, according to our table, has eighteen refineries, nine of which are located at Witchita Falls. (50%)

Texas has seventy-nine refineries, eight of these being located at Dallas. (10%)

Arkansas has four plants at El Dorado out of five located in the state. (80%)

Massachusetts has two, both at Boston. (100%)

Firearms

Of seven firms in Connecticut, three are in New Haven. (42.8%)

Massachusetts has four firms, two of which are relatively close - one at Springfield, one at Chicopee. (50%)

Machine Tools

Of twenty-six machine-tool firms located in Massachusetts, twelve are located in Worcester. (46%)

*McRae's Blue Book American Business 1940

Aircraft

Of twenty-four firms in California, three are located at Burbank; two are located at San Diego, and the remainder are distributed one per city.

Steel Works

Pennsylvania - sixty-four of the one hundred and thirty-one firms are located at Pittsburg. (49%)

Although some concentration is unavoidable and some industries seem to be adequately distributed within their state lines, it must be recognized that from the aerial viewpoint the location in towns within a limited area makes the concentration serious, because a paralysis of industry by military attack does not necessarily affect a single city but it can be of sufficient extension as to affect an entire county, state or region.

It must also be taken into consideration that if a certain area within the nation is completely controlled by a hostile power, the loss in the productive capacity may be sufficient to seriously affect the safety of the entire nation. For example, if the State of California were controlled by an invading army, or enemy aircraft succeeded in systematically destroying the twenty-four aircraft factories located there, the loss in productive capacity could be so great as to seriously affect the safety of the entire nation.

In summarizing we may safely say that available statistics indicate that there is a dangerous concentration of industry, and the existence of an unbalanced condition in the nation cannot be denied. The data which are available for study cannot be accepted as totally accurate because it must be remembered that it can be analyzed only within the meager limitations of census reports and manufacturing

statistics; and it is difficult, if not totally impossible, to secure statistics on vital defense industries or to secure data of actual production under the pressure of "national emergency." Furthermore, classifications of various statistical sources vary between governmental departments, and many industries whose normal production is classified as "nonessential to defense" transform their facilities to war-time production on a war basis and thus our statistics are no longer a true indication of actual conditions. It must also be taken into consideration that some industries have a high value of finished products and a low employment figure, while others have a high employment figure and a relatively low product value.

If we recognize that discrepancies exist and content ourselves with averages which reflect general conditions which exist in the various sections of our country, we will have the most accurate barometer which is available under the circumstances. The combined use of percentages of population, wage earners, and value of manufacture serve as indicators of the location of the nation's productive facilities.

In time of war the areas which produce and employ most in time of peace naturally will have the greatest capacity for military supplies and equipment, and a "peace-time concentration" will continue to exist or become even more acute in times of national emergency.

Admitting that the nation's resources are more or less "all in one basket" and that very little can be done to change the location of industrial production, we must turn our attention to making the best of a bad situation. Our hopes of future security must be based

upon the slim chance that we will have time to rearm to a sufficient degree that if that fateful day should ever come we may be sufficiently armed to defend the northeastern area from attack or invasion and thus assure continued production of supplies and equipment for our military forces.

Having recognized that a dangerous situation exists in regard to the location of industry, one naturally seeks the answer to the question of what is to be done. At the present time no extensive decentralization can be undertaken, except where new plants are contemplated, because we are in a race against time, and maximum production of defense materials must be attained with the least delay. To hamper the maximum utilization of our present facilities is national suicide; therefore, we must protect our means of production to the best of our ability until such a time as complete decentralization becomes practical.

The Defense of Industrial Areas

The first line of national defense for our congested coastal areas is the navy. It is necessary for the navy to engage in offensive operations for the defense of our shores in order to prevent the enemy from launching a combined sea, air and land attack on our coastal cities. The acquisition of air and sea bases substantially increases the range of operation of a modern battle fleet and thus insures the more effective protection of a nation's mainland, and the effectiveness of scouting as well as naval maneuvers is increased tremendously.

The creation of an Atlantic squadron which will be increased to the size of a fleet is an important step in defending our most vulnerable industrial area. Present plans call for the contruction, within

the next five years, of vessels ranging from 45,000 ton battleships to 400 small "E" boats*. This plan may be said to be the most intelligent action that can be undertaken under present conditions and should serve to sufficiently defend our shores until a superior fleet can be built, or concentrated by a combination of enemies. Unless our sea forces are severely crippled or destroyed, it is difficult, if not totally impossible, for an invader to operate effectively within striking distance of our shores.

The elimination of our navy would present a serious situation to the productive facilities of the nation. It would mean that the air arm of a hostile fleet operating from concealed or protected carrier ships could effectively attack objectives within a radius of two hundred fifty to five hundred miles, and cities and seaports might not entirely escape shelling by the heavier vessels operating in coastal waters. Though effective defense can be carried out by the strategic location of coast defense guns, mine fields, and the scouting operations of "E" boats, aircraft, submarines and auxilliary vessels, these defense operations only serve as barriers to the landing of hostile troops, but they cannot prevent a curtailment of manufacturing activity. The complete destruction of our coastal cities by naval forces would be a difficult operation by sea but combined with the airplane destructive results of sufficient magnitude could possibly be attained.

The protection of factories from air attack has presented one of the major military problems of modern war and the location of our manufacturing facilities makes the problem still more acute. There are three methods of protecting factories from aerial attack. These

*Fast motor boats equipped with four torpedoes and used for coastal defense and scouting operations.

methods may be said to be through location, anti-aircraft gun emplacements, and lastly, the use of interceptor planes to harass or turn back the enemy. Under our present system and the race against time the location of existing facilities cannot be changed. One cannot readily move a large factory to a terrain which because of its mountains, mists, etc., and other geographical factors limits visibility from the air. It is equally difficult to camouflage modern buildings or to transfer a major portion of their activity underground. Regarding our present manufacturing facilities, the first and perhaps most effective method of defense is out of the question.

Turning our attention to the second method commonly employed we are faced with an equally difficult problem. Modern war has shown us that effective concentrations of anti-aircraft fire harass the attacker to such an extent that he fails to reach his objective or forces him to maneuver to such an extent that his aim is poor and the destruction is limited. The difficulty with this method of defense is that in our cities the targets are so closely grouped that a bomb dropped in a haphazard manner is apt to be just as effective as one aimed at a specific target.

The last method, namely, that of using interceptor planes, is the most effective method which can be employed; but again our industrial locations, in a majority of cases, affect the degree of complete protection which such a protective system should provide. The effective operation of this system requires the division of the area to be protected into squares which are located on maps at a district headquarters and a number of air fields located at advantageous points.

Lookout posts are provided at strategic positions throughout the area, and warnings are reported to headquarters as attacking planes pass over each post. The proper operation of this system requires distances of from sixty to one hundred miles intervening between the time an enemy plane is first sighted and it reaches its objective. This period of time is estimated to be the minimum time necessary to chart the location of the attacking aircraft and to order out defending aircraft.

A recent further development of this system of defense provides certain posts in an area to be equipped with radio listening devices which locate the radio beam used by bombers for the purpose of reaching their objective. The plotting of the plane's course by means of the radio beam by two listening stations indicates on a map the probable objective to be attacked, and necessary defensive preparations can be undertaken several minutes before the enemy launches the attack. The use of either of these methods is designed to determine the attacker's course, altitude, and other technical data at a central point and then to coordinate interceptor planes and anti-aircraft batteries in such a manner as to secure the maximum results possible by interrupting the attacker's plans before he reaches his intended target.

The effectiveness of this method of defense has been found practical, but since it takes from five to fifteen minutes for a plane to leave its base and gain sufficient altitude (depending upon the type of plane, its readiness for departure, and its distance from attackers) for combat, it may be readily seen that timely warning is the essence of a successful operation of this plan. In an interval of fifteen minutes a modern bomber can cover as much as one hundred miles; therefore,

it is imperative that all calculations be made in minutes or even seconds.

Many of our industrial centers are located too near the coast line for this system of defense to operate successfully, and the number of available air fields near our factories is limited. The importance of the location of industry can readily be seen as an acute problem, particularly if our navy failed to hold an invader away from our shores. An immediate curtailment of essential war production would result as soon as an enemy based his aircraft (either on land bases or aircraft carriers) within a few hours from our New England coast.

With a curtailment in the production of vital necessities and a weakening of the morale of the civilian population, the effectiveness of the army to repel attack would be hampered and an enemy force might establish a "bridgehead" on our coasts and quickly secure control of a major portion of our industrial area. Once the army is deprived of its supplies for mobility and battle, it quickly disintegrates, and it would be necessary to abandon the campaign and our nation would be lost.

The immediate future holds a gloomy outlook particularly for New England and the Middle Atlantic states as well as the southern coast line, but our naval, military and air programs will provide the maximum defense under adverse conditions. A large and modern navy with strategic bases can bear the brunt of any attack and prevent the movement of sufficient men and materials to permit a military campaign against the industrial sections of our country. A powerful air force, properly equipped and strategically based can effectively prevent,

at least for the next few years, air attacks of serious consequence. Canada's friendliness provides us with a potential ally to the north, and a cultivation of South American neighbors should provide a fair degree of safety to the south. Except for nuisance raids by enemy aircraft our industrial centers can be effectively protected by pursuing our present military and economic program, and once the nation is fully armed there is less to fear from a lack of armaments but more to fear from possible attack. The course of the present conflict will determine, within the next few months, to what degree of danger our factories and resources will be exposed, but a system of decentralization (as discussed later) must be recognized as a part of our future industrial plans regardless of the outcome of present hostilities. In modern war, events move fast and changes in methods and equipment are startling. One never knows what the future months or years may bring, but it is wise to prepare for the future and attempt to anticipate conditions which may exist several years hence.

Civilian Problems in Urban Areas

In addition to the problem of supplying our armed forces, we must remember that the civilian population must be insured maximum employment and the necessities of life in sufficient quantities to insure a maximum output in terms of productive capacity. A localized condition of industrial activity does not always permit the civilian population to work at maximum capacity, and in time of stress the morale may tend to drop far below what it would under decentralized conditions. The concentrated targets existing in congested areas affect productive capacity in two ways. First, the chances of "direct hits" on military

objectives are increased and the resulting time lost while repairs are effected can never be regained. Secondly, the total working time lost during air raids is greater, because during a raid over a single objective a larger amount of workers will cease operations. Thus, if 100 hours per month had to be spent in air raid shelters by 10,000 workers, the loss in production and working time would be greater than if only 500 workers were affected.

In congested areas loss by aerial bombs is greater and the loss of life rises in proportion to the degree of congestion. This results in a lowered morale among the working people whose homes, relatives, and places of employment are destroyed, and a direct loss to the nation through the destruction of manpower by explosions, fire, famine, and disease. The factor of increased fatigue, due to lack of rest, is introduced by more frequent raids over congested areas; and the disruption of communications, transportation, and public services affects the individual's productivity as well as his morale. The destruction of warehouses, housing, and water supply systems creates greater problems in highly congested areas because of the dependence of the population upon the various services which they are accustomed to receive. The use of governmental employment agencies can immediately reassign workers to new positions in order to permit the individuals to continue working with a minimum of delay, while the problems of food and housing shortages can usually be worked out satisfactorily in emergencies. It must be recognized that where localization exists, it will be virtually an impossibility to have sufficient quantities of all the necessities of life at all times, and privation and suffering will be necessarily more

acute in such areas. Examples of the helplessness of large cities can be noted by recalling the food and transportation shortages during floods, hurricanes, or strikes, and the impossibility of securing transportation to areas where the necessary articles could be found. The inconvenience which was felt by city dwellers under these conditions would increase many times under war conditions.

The Transportation Problem

There must be a uniform flow of raw materials into the factories for processing and a reversal of the procedure for the finished product. Many vital raw materials classified as "strategic materials" are secured from Japan, China, the Indies, Africa, Russia, the Phillipines, and Italy; these include tungsten, antimony, mica, silk, coconut shells, manila fiber, tin, quinine, rubber, mercury, manganese, and chronium.* A naval blockade could prevent the procurement of these essential products, so the National Defense Advisory Commission, the Reconstruction Finance Corporation, and the Procurement Division of the Treasury are collaborating in the purchase of stocks of these necessary materials. In addition to this activity, substitutes for the essential products are being developed and local sources for similar materials are being exploited.

One may well ask what all this has to do with the location of industry. It naturally develops into a problem of transportation. In time of national emergency the transportation facilities of any nation are taxed beyond capacity. The concentration of industry within a given

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*Popular Science Monthly, December, 1940, p. 76-77

area causes congestion, delays and eventually a disruption of production schedules. A lack of raw materials causes waste in manpower and productive capacity, and the strength of the armed forces is weakened accordingly. Wherever possible a location closer to its source of raw materials may provide material benefits by decreasing the time lost in transportation and by releasing carriers (either water, rail or truck) for other important work.

Under present conditions it is necessary for the government to provide storage facilities for these strategic raw materials in readily accessible places for those industries which require them because an overtaxed transportation system cannot be depended upon when it operates beyond capacity. The construction or use of warehouses in our industrial areas again makes us recognize that "we have all our eggs in one basket." The destruction of several warehouses of strategic war materials might be just as important a military success as destroying a factory, for if raw materials are not available for processing then the factory ceases to have military value and the all important elements of manpower and productive capacity are idle.

Localization of industry also supplies problems in furnishing an army in the field with its finished products. Modern wars are wars principally of movement, and the effectiveness of a fighting force is directly affected by its ability to receive supplies and equipment on time. In the World War, ships could be unloaded in comparative safety and railroad lines could be operated practically to the battle line. The introduction of the airplane has permitted the destruction of permanent lines of communication, and it has become a more difficult problem

to maintain the flow of materials from the factory to the scene of military operations. With localized industry, materials must be transported to a railhead sometimes hundreds of miles from the point of operations and then transported to movable bases where supplies and materials are further distributed to the military units requiring them. The longer the distance between factories and railheads, the greater are the possibilities that air attack will disrupt the lines of communication.

Assuming that a military force is operating in one of the western states against a hostile power, it would find it necessary to depend upon much of its material from the eastern section of the country. Long range enemy bombers could destroy bridges over the Mississippi and hinder the free movement of materials and supplies. The invader might be in a position to cut off the defending forces or destroy them due to an inability of the defenders to maintain contact with the industrial area. The location of at least one plant, under such conditions, west of the Mississippi might mean the difference between victory and defeat.

The importance of maintaining our transportation system in operation at all costs can be recognized by a few glaring examples of the difficulties which must be met under our present system. It is not uncommon to find brass goods manufactured in Connecticut from copper mined in Arizona and refined and smelted in New Jersey. The finished products may then journey to Michigan for installation in motor cars. Wheat is grown in Kansas, milled in Minneapolis, and then shipped to all sections of the country. Silk is transported from the Orient to San Francisco, to our New Jersey factories for manufacturing, to New York for processing, and then back to the West Coast for consumption. Similar conditions exist with a thousand and one items both vital to defense and necessary to the

civilian population. We find ourselves concerned not only with the economic criticism of a wasteful system but a tragic condition which seriously affects our national security. The interdependence of the country's geographical areas causes concern regarding the maintenance of transportation.

An analysis of the merchandise moved during the year 1938 within the nation shows the relative importance of the various means of transportation.

Volume of Intercity Traffic by Kinds of Transportation*

Agency	Miles 1938 Millions	Percent of Total 1938
Railways - Steam and Electric	292,510	62.82
Trucks:		
For Hire	17,500	3.76
Private	22,500	4.83
Total	40,000	8.59
Inland Waterways	66,746	14.33
Oil Pipe Lines	66,400	14.26
Air Carriers	10	.01

Although it is impossible to determine how much merchandise is handled back and forth over the same route, it must be recognized that localized industry necessarily causes a large amount of uneconomic handling and transportation. The speed with which freight can be dispatched from one section of the country to another has a direct bearing upon the nation's production and security. Delayed shipments can easily result in idle men and machines, disrupted production schedules, and a weakening of the striking power and effectiveness of our military forces as

*Interstate Commerce Commission Report-1939

well as suffering and privation for the population of our large cities whose very existence depends upon the adequacy of transportation.

It is impracticable to determine the future status of railroad facilities under actual war as well as the extent to which they may be utilized. As a result of the experiences of the past war, a great deal of criticism has been prevalent about the uncertainty and inefficiency of railroad operation. It must be admitted, however, that the system did not have the experience of an emergency and that there was very little competition to force a more effective operation of the rail system. The railways themselves blame their 1917-1918 dilemma upon the use of freight cars for storage facilities and the resulting shortage of rolling-stock. In spite of all the excuses which are offered for past errors or shortcomings, we find that a combination of competition and strict government control has placed the railroads in a position where they are forced to operate as efficiently as possible.

Railway officials are extremely optimistic of their ability to handle any emergency which faces them within the next few years. They point with pride to the fact that they were able to move 40,000 men a day in 1940 in August for summer maneuvers as compared with 20,000 men daily in 1918, and that 60,000 carloads of lumber for the construction of army camps were moved on schedule without delaying either construction or regular traffic.* It is impossible to predict how satisfactorily the railroads will operate in an emergency, but it can be stated for a fact that they will endeavor to cope with any emergency in order to avoid government supervision through the transportation division of the National

*Saturday Evening Post: Association of American Railroads, Washington, D.C. February 22, 1941, p. 83

Defense Advisory Board in place of actual government operation in order to assure prompt dispatch of shipments and prevent unnecessary transportation.

Rerouting of trains will, no doubt, be frequent and necessary, and active measures will have to be taken to provide for quick or emergency repairs to terminal facilities, switch yards, bridges and important trunk lines. The hurricane of 1938 severely affected all transportation in the New England area and destruction in a modern war will probably be more extensive. The answer to the maintenance of railroad facilities will be adequate repair equipment and trained crews. All the protection possible must be provided for our railroad system because it is concentrated in direct proportion to our factories, and it will face its share of destruction from air attack and saboteurs.

In national defense, railroads must bear the largest part of the nation's traffic particularly if coastwise shipping is hampered by enemy activity. The emergency will, in addition to raising the railroad's proportionate share of all traffic carried, undoubtedly cause the other systems commonly employed to divert some of their share as speed becomes paramount and other means of transportation become unreliable. Due to the fact that railroads are fixed in their location and limited to operate on the established tracks and trunk lines, we may find that delays will be frequent and freight may be severely delayed in transcontinental shipments.

Our pipe lines may not be strictly regarded by some as a means of transportation as they are relatively few and their use is limited, but since they are an important means of moving essential commodities, our

discussion must include these as means of transportation. The transportation of oil and natural gas is extensively accomplished through the use of this system, and our figures show that in time of emergency if the operation of pipe lines continues without interruption, they release other means of transportation from this important work. Like the railroads, pipe lines represent fixed equipment; unlike the railroad lines, however, they can be covered and pumping stations can be camouflaged from air attack to a considerable degree. The greatest danger to this system would lie in control of the territory through which the line runs by an invader or by sabotage at some point along the route of travel. The importance of this type of transportation cannot be denied, but it will necessarily be limited to the maximum quantities for which the lines are designed and to commodities in a liquid or gaseous state.

Our inland waterways are theoretically regarded as one of the most practical, dependable and economical means of transportation. It is, however, favored by bulky commodities and lacks the speed which other systems of transportation enjoy. It has been found that if adequate protection can be provided for dams, locks and other facilities connected with inland shipping, that destruction by air attack of the natural means of transportation is practically impossible. The greatest hazards to inland shipping are encountered when bridges spanning rivers are destroyed or when ships are sunk in the channel as a result of "direct hits." Usually stoppages of this nature are temporary and the use of adequate protective facilities in the inland areas minimizes the possibility and effectiveness of this type of attack.

If we turn our attention to sea transportation, we find that the

modern war policies of nations include a continued participation in foreign trade insofar as possible, thus keeping the economic ties between nations as normal as conditions will permit. Unless an offensive war is waged in another continent, the operation of vessels becomes hazardous if not impractical. The necessity of continuing foreign trade for the economic benefits which will accrue after the cessation of hostilities encourages the operation of vessels even under adverse conditions.

The western hemisphere is practically self-sufficient, but until effective substitutes are found for vital materials, some foreign trade must be carried on whenever possible. Our policy of protecting the entire hemisphere makes some ocean travel necessary as all our neighboring nations are not self-sufficient in all commodities and their ability to meet resistance has a direct bearing upon our own.

Our expanding navy is the greatest assurance of the maintenance of sea transportation, but our concentration of shipping and shipbuilding facilities are a decided attraction to military conquerors. Although our shipbuilding and terminal facilities for ocean-going vessels are distributed along the coastline, we have a decided concentration in the Atlantic seaboard. The concentration of industry has brought with it a concentration of shipping which must be protected, but complete protection cannot be assured.

The use of mine fields, coast defense artillery and anti-aircraft emplacements are the usual means of protecting a harbor. Although they can effectively prevent a military force from affecting a landing they cannot prevent some destruction to shipping from heavy naval guns or planes without prompt naval and air resistance by superior numbers. The

only guarantee to safe ocean shipping with minimum interruption is offensive military action which keeps the attacker thousands of miles away.

The construction of the St. Lawrence Waterway will be an important step in encouraging the development of shipping in an inland or protected area, but like all other plans it will take considerable time for the approval and completion of the project. For the present, as in many other activities concerning the national welfare we will find it necessary to utilize our facilities to the greatest advantage and protect them as well as we can.

In the use of highways and motor transportation we find a growing method of transportation which is both flexible and economical. Trucks have the advantages of speed, convenience, and economy.for most types of hauling and they possess the additional advantage of not being limited in their range of operation by a roadbed or extensive investments in equipment and terminal facilities.

Unlike some of the other systems of transportation, the motor truck is never seriously affected by enemy attacks and might prove to be the most dependable means of moving commodities in time of war. Due to the fact that shipments are distributed over a large number of trucks, losses tend to be smaller. The destruction of roads by air attack is limited and repairs are comparatively easy to make. Trucks can be easily detoured and, if actual invasion of an area is imminent, they can be transferred away from enemy operations and their services are not lost.

Up to the present time, the truck has been found economical particularly in "short-haul" operations and as a means of feeding the

railroads and steamship facilities. Its use in "long hauls" for certain types of merchandise is slowly increasing, and as uniform state laws covering truck weights and operation are enacted, further expansion of operations over longer distances can be expected to increase.

Even though trucking has played an increasing part in the development of transportation, there are certain factors which will tend to limit the importance of this type of transportation. It can be stated that its favourable influence to decentralization is important as evidenced by the fact that 124,329,000 families, or 7,844,509 people, representing 6.3% of the country's population, lacks railroad facilities and is entirely served by trucks.* This group of people comprise an area of 122,473 communities of 48,492 counties, which represent an area of 39.6% of the nation.* In an emergency, however, these people must continue to relay on motor transportation, for industry will utilize available equipment as feeders for other forms of transportation, and the military forces will make heavy demands on this type of transportation as soon as it becomes necessary to furnish military supplies to bases located at a distance from rail terminals.

The amount of heavy trucking equipment suitable for transcontinental hauls is limited, and the quantities of material which can be hauled cannot be impressive. The following table analyzes the nation's equipment according to size and illustrates the limited importance which trucking can have in a period of emergency:

*Motor Facts, Automobile Manufacturers Association, 1940.

Truck Registrations in 1939

Classified According to Carrying Capacity*

Capacity	Number of Units	Percent of Total
3/4 of ton or less	1,644,166	38.18
1 ton but less than $1\frac{1}{2}$	84,974	1.98
$1\frac{1}{2}$ tons but less than 2	2,247,219	52.27
2 tons but less than $2\frac{1}{2}$	132,935	3.09
$2\frac{1}{2}$ tons but less than $3\frac{1}{2}$	108,490	2.52
$3\frac{1}{2}$ tons but less than 5	44,138	1.03
5 tons or over		
Total Commercial Units Registered December 31, 1939)	4,299,000	

Trucking cannot be considered to be expanded to the point where it can displace the railroad as a major means of transportation, but it should be regarded as a supplementary or auxilliary method which increases the efficiency and economy of our entire transportation system.

Although new road construction has been constantly increasing, the inadequacy of our highways to accommodate the combined movement of military units, commercial trucks, and a general exodus of the civilian population is generally recognized. Military and aerial action is expected to cause severe congestion, and highway problems are anticipated by defense authorities as defense plans include the construction of military roads, parallel highways, and super-highways.

The air transport is rapidly increasing in importance as a transportation factor, but its use in the carrying of commodities is limited. We find that as long as a nation maintains superiority of the air, it can operate transport planes with little or no interruption if it is provided with reasonable protection. For limited use, transportation

*Motor Facts, Automobile Manufacturers Association, 1940.

by air is practical and effective, but it can never be considered as an extensive substitute for the other types of transportation. The difficulties which are encountered are that aircraft are important military weapons, so their use for other purposes is suppressed and manufacturing facilities are completely utilized for military construction. This prevents the replacement of existing carrier planes, which quickly depreciate, and checks the expansion of commercial aviation. Thus it can be readily seen that this type of transportation is limited particularly to emergencies, specific purposes, or for carrying merchandise having a high value and small bulk.

Factors Favoring Decentralization

Within the past twenty years a number of developments have taken place which have made industrial decentralization a possibility. The principal factor has been the development of electric power transmission and the subsequent popularity of individual electric motors as prime movers in industrial installations. The following chart shows the extent of the increased electric power used by industry in the past few years:

Electric Production and Production Capacity*

	Production (1000 Kilowatt Hours)	Capacity (Kilowatts)
1920	43,334,282	14,372,009
1925	65,751,137	23,512,000
1930	94,651,597	34,055,319
1935	98,464,073	36,074,442
1936	112,181,242	36,564,442
1937	121,836,813	37,134,382
1938	116,681,423	39,042,105
1939	130,336,050	40,317,924

*Report of Federal Power Commission, 1939.

We find that during this period the nation's generating capacity has increased, while the cost per kilowatt hour has decreased. In fact, central station operating efficiency has increased to the point where improved service and lowered rates have caused many firms to use purchased current rather than manufacture their own.

Installed Industrial Motors to Use Purchased Power*

Year	Total No. Motors	Total H.P. of Motors	Percentage to Total Horsepower
1899		182,562	1.8
1904		441,589	3.3
1909	199,309	1,749,031	9.4
1914	447,502	3,884,724	17.4
1919	976,463	9,284,499	31.7
1923	1,445,003	13,365,663	40.4
1925	1,724,180	15,868,828	44.3
1927	2,151,675	19,132,310	44.5
1929	2,724,843	22,775,664	44.5

The government policy of rural electrification and the construction of electric power projects is constantly extending the system of electrification, expanding the possibilities for the decentralization of industry into more remote rural areas. The improvements in generating and transmission equipment have resulted in bringing the cost of even steam or Diesel generated power to new low figures, and many firms install generating plants only for emergency use and purchase their normal power needs from central stations. With these newer developments we find that the power factor governing the location of

*Public Utility Industries, Wilson, Herring and Eutsler; McGraw Hill Book Co., 1936, New York, Pages 90 and 92, derived from Electrical World Volume 106 #1 1936 pp. 57, 70.

Abstract of United States Census, 1930, pages 823-824.

industry has become negligible, in a majority of cases, as a factor to be considered in industrial migration.

The second natural development which is favorable to industrial movement has been the development of motor vehicles and highways. This factor is somewhat local in scope and encourages decentralization within geographical areas rather than in the nation as a whole.

The motor truck has enabled the manufacturers of the nation to locate economically at distances from the railroads or markets, particularly if their manufacture was not restricted to the heavy, bulky commodities. The high costs of urban locations can be avoided through a location in rural areas and the necessary transportation between markets and rail terminals can be economically accomplished by using motor trucks.

In addition to this, the passenger motor car has enabled the manufacturer to tap a relatively wider labor market, and if he is strategically located in a rural area he can usually secure his labor from a radius of fifty miles or more. It is not an uncommon occurrence for people to travel to work daily in their own cars from distances as far away as eighty miles. In many cases, the motor car has caused the population to move into the rural areas and go into the cities for work or shopping, thus increasing localization of industry rather than diminishing it. However, high taxes, rent, investment costs, and traffic congestion have forced the establishment of subsidiary shopping and manufacturing areas. If this movement continues, decentralization within areas will be encouraged to a considerable degree.

The speed and ease of communication might be listed as a

decentralizing influence, but it can also be regarded as a localizing factor. As its contribution in permitting industrial migration, ease of communication has importance because one sometimes can transmit either spoken or written messages across the country much more easily than within his own immediate locality. This factor allows constant contact with markets miles away and coupled with the transportation and power developments permits a greater amount of decentralization both within a region or area and within the nation as was not heretofore possible.

The final natural decentralizing influence has been the recent division of labor in industry. As manufacturing operations were divided, the need for skilled labor grew less, in many industries, and we find that a quantity of unskilled labor was substituted in a majority of operations. This has been important because it has eliminated the need of locating close to a source where skilled labor was abundant and resulted in some decentralizing which was not possible under opposite conditions.

Since the present administration came into power in 1932, its social policies show a pronounced effort to encourage the movement of industry in the hope of establishing a more normal balance between agriculture and industry and encouraging the rehabilitiation of rural areas. This policy was designed primarily to benefit agriculture and at the same time to equalize the rise and fall of business activity in order to alleviate much of the suffering and expense of economic depression. Perhaps its greatest experiment toward industrial decentralization was the TVA Project where it was hoped the lure of cheap power would attract industrial development. Similar developments have been

attempted or are projected at Central Valley (Colorado), Boulder Dam, Fort Peck, Grand Coulee, Bonneville, Passamaquoddy, Casper Alcova, Blue Stone Reservation (West Virginia); and with the proposed construction of the St. Lawrence Waterway a power plant is slated for the northeast area.

In addition to the lure of cheap power, social legislation and government labor policies tend to eliminate the labor advantages which might be derived from specific localities because wage scales tend to be uniform either by minimum wage laws or union activity, and the 40-hour week throughout the nation will undoubtedly result in plant expansion, particularly during a period of business recovery. With plant expansion and the elimination of much of the advantages and barriers in industrial location, plants will endeavor to locate where industry can produce and market its products more economically; therefore, it is not surprising to see branch plants being established in other sections of the nation.

As a part of the national defense plans, government contracts are let on as wide a geographical area as possible for two reasons. Principally, the idea is designed as a precautionary defense measure to encourage decentralization by distributing the contracts over a wide area and secondly, a political and economic reason - that the entire nation may receive the benefit of the money and business which is created by this gigantic expenditure.

As an additional means of actually decentralizing defense industries, new plants will be sponsored by the government, and if not built by private firms they will be built and leased by the defense authorities. In both of these cases the location will not be determined by industry but according to governmental desires and military

strategy. This relocation will, it is expected, result in additional industrial expansion in the areas of the new plants in order to supply the new markets which new industries will create.

As an integral part of the decentralization scheme, trial, or educational orders have been issued over a diverse number of industries and areas to permit plants to "tool up" for war industries. A combination of British and domestic demands for armaments encourages manufacturers to expand their productive capacity. Many, however, hesitate in making new investments because limited profits and the risk that the armament program may suddenly stop makes the future uncertain. In view of these conditions steps have been necessary to encourage the essential plant expansion and to increase the nation's productive capacity to meet needs of the defense emergency.

The government construction of plants and the subsequent leasing to private manufacturers or government operation is a very active step toward decentralization. Here industry has nothing to lose as a result of a sudden cessation of armament activities.

Private plants constructed with private funds can amortize the cost of plant construction during the short period of five years and may deduct this amount from their income or excess profits taxes. This policy permits the investors to recover the cost of the plant during the defense program, and since there are indications that armament production will probably extend over five years, there is little danger to fear from loss.

For those plants desiring to expand, it is proposed to extend Reconstruction Finance Corporation help to them for expansion purposes.

This assistance will be an exception rather than the rule, because wherever possible the government desires that the program be privately financed. There is a timidness on the part of private investors to place money in plant expansion at this time because profits on government contracts will be limited to 10% by the excess profits tax. Skilled labor is scarce, and the time-and-one-half provisions of the Wage and Hour Law will further limit profits if labor is allowed to work overtime. It seems that the prospects of limited profit, the possibility that the plants might not be amortized in five years, and the supplementing of control by management by government and union dictation will force the adoption of Reconstruction Finance Corporation loans or other than private financing in a great many plant construction projects.

Barriers to Decentralization

Even though we have evidence that the government is taking positive steps in an effort to bring pressure upon industry to decentralize, there are many deterrent factors which will necessarily hinder the program to a considerable extent. The expense of moving for any industry, whether it decides on a complete migration of its entire plant or merely the establishment of branch plants, is impracticable from a number of angles. First we find that to construct a new plant involves a considerable outlay of funds which cannot always be justified by the economies which will be effected or the greater volume of profits or sales which can be secured. One might argue that the firm might lease the necessary space, but most large industries which decide to transfer activities elsewhere find it difficult, particularly in undeveloped regions, to

readily obtain a suitable plant and usually if one is found alterations must be made to adapt it to the particular products manufactured. We also find that the peculiarity of certain industries prevents the efficient operation of small plants and the construction of a duplicate plant or facilities would result in both plants operating at a loss.

A further deterring factor to business migration is the comparative immobility of a skilled labor supply. Men dislike to leave old friends and relatives, sell their property, and then go to the expense of repurchasing, or moving their household furniture and transporting their family to some distant city. Where skilled labor is an essential part of an industry this factor sometimes assumes the character of the greatest deterrent to a transfer of industrial operations.

Sometimes the lure of higher wages or unemployment can be counted upon as sufficient inducements to take skilled labor away from its usual habitations, but as a general rule the majority of skilled labor is able to secure employment nearer home and prefers this rather than migrating several hundred miles away.

The so-called "Settlement Laws" are another restriction to a migration of the labor supply. These require a residence of up to five years, in many states, before an individual can apply for relief from the established governmental agencies. A standardization of all state laws or the Federal regulation of relief to migratory workers would be helpful in providing an added impetus to the movement of labor. If an adjustment were made of the unemployment compensation laws, or compulsory dismissal wages were required, it might be possible to transfer the workers back to the state of last residence. To provide for this transit

would restore the worker's ability to secure relief, but it would not provide effective decentralization, for it would tend to place burdens upon many communities that have lost a remunerative industry by migration and therefore their revenues do not justify an excessive relief burden..

A much more mobile labor supply is now being created by many firms by instructing apprentices on the floor of the plant to take care of expansion needs. With the establishment of new plants, younger men will be anxious and enthusiastic about new opportunities being offered, and having few or no dependents and a desire to establish themselves in a life position, their transfer to new locations can be effected much more readily than older men who have lost the eagerness and vigor of youth and have settled in a locality.

Much decentralization, if it is to be a true decentralization, will result in higher production costs and transportation expenditures. In the east we find that railroads have provided every convenience for shippers, and every fair-sized plant has its own railroad siding for the delivery of raw materials and the dispatch of finished products. Its markets are within a comparatively small radius and the density of population makes advertising and distribution both economical and effective. As a general rule the labor supply is over abundant and the productive facilities can be utilized to a maximum degree.

In many of our central western states where the migration of industry would be desirable, we find that opposite conditions usually prevail and there are few firms that can move into a rural community and operate as effectively as in the more congested areas. Although

the railroads have a large amount of trackage in the sparsely settled sections of the country, it is doubtful whether the service can always be readily furnished direct to the plant site, and a considerable amount of trucking may be necessary both for raw materials and finished products. In addition, it is doubtful whether train service in many sparsely settled communities is as frequent and rapid as in more congested areas. Naturally, in time it can be predicted that a satisfactory and efficient transportation system can be developed in any community, but industry cannot stand, in the face of competition, the inconveniences and expense of awaiting the industrial development of its new area of location.

A further barrier to industrial migration is the inadequacy of housing facilities. The shortage of housing is acute in areas which are feeling the effects of industrial expansion and similar conditions can be expected to occur at any point where industry should choose to migrate. Scarcities of housing are being felt primarily at Rockdale, Illinois; Portsmouth, New Hampshire; and Hartford, Connecticut; and rentals are soaring skyward in the vicinity of government navy yards, army posts, and at other centers where industrial construction or expansion has been undertaken. Workers are found to live under inadequate conditions, and the living expenses are taking a major portion of their earnings. Unless a worker is totally unemployed and lacks any means of subsistence it would be difficult to persuade him to move where such unattractive conditions prevail.

The construction of Federal Power Projects through hydroelectric installations as a part of the rural electrification program

has served as an inducement to force industry to migrate. Here we find that the incentive has "back-fired" and that in an emergency there are signs that all is now well with government power. In pointing out a specific instance, we must turn our attention to the TVA plant. The Alcoa aluminum plant derives its electric current for the manufacture of aluminum solely from TVA. With its inception of operations TVA purchased the plants of independent utilities in its area of operations, dismantled their plants, and became the sole producer of electric power. With added defense demands for aluminum, we find that TVA is unable to produce sufficient generating capacity for Alcoa's plant and its other customers. Thus we find the Tennessee Valley Authority trying to make arrangements for supplementing its productive capacity with a steam generating plant. It is now recognized, though not generally admitted, that cheap power was produced as a result of government subsidy, that operating costs of private companies were relatively lower, and that if private enterprize in the power field had been allowed to exist there would have been sufficient generating capacity for all potential needs. Public utility capacity is said to be more flexible in regard to expansion when conditions justify it, but since either government ownership or private utilities can be "bottle necks" in a crisis, a combination of both will perhaps be the most effective solution to our power problem.

If these conditions can be regarded as a criterion, it can be expected that the increasing use of aluminum, electric furnaces in the steel industry, and power requirements in general will make industry hesitate before it moves to an area whose potential electrical

requirements may rapidly exhaust the only source of supply.

In an effort to prevent industrial migration there is a constant competitive spirit among various states to attract new industries or hold old ones. It seems that the tendency of state publicity bureaus, however, is to concentrate most of their efforts in an attempt to attract new industries, paying very little attention to the retaining of old ones. This does much to counteract the migration of industry and it does not encourage decentralization because the richest states or communities with greater manufacturing activity can afford to offer greater inducements and to spend more in advertising their merits to the world at large.

In contrast to this activity small communities possessing inexpensive land or a low tax rate offer tax-free property for industrial development or donate the land for construction, but the axiom "business thrives best where business is most" seems to be the rule followed; and when two contending forces contest for industrial supremacy, the largest usually has the greatest influence and industry tends to remain concentrated.

Extent of Natural Decentralization

There has been a degree of natural decentralization, but much of it has been a transfer from one congested area to another.. In a statistical analysis of any shift in industry of this nature, it is difficult to secure a true statistical figure to reflect the shift of industry because of the changes in business activity which occur in different sections at a particular time and the general rise or fall of business activity during periods of prosperity and depression.

Furthermore, if one examines specific industries one may find that the migration of a single industry in one state may give a small percentage of change when compared to national production but may give a very high ration of change if compared to the total production within the state.

One of the most comprehensive studies on industrial migration is the Iowa Studies in Business No. VII*, published in March 1930. In this study the year 1914 was taken as the index-year (with 100 as the base), and changes in business location were analyzed to the year 1927 in an effort to secure a representative year unaffected by excessive depression or prosperity. As a result of the computations made in the study, the following changes were stated to have taken place in regard to industrial activity.

Concentration of Manufacturing in Various Geographical Areas

	1914	1927	Net Change 1914-1927
New England	12.85	10.80	- 2.05
Middle Atlantic	34.14	32.77	- 1.37
East North Central	27.83	30.69	2.86
West North Central	6.41	5.67	- .75
South Atlantic	6.88	7.77	.89
East South Central	3.17	2.84	- .33
West South Central	2.79	2.74	- .05
Mountain	1.67	1.17	- .50
Pacific	4.25	5.55	1.30

It was concluded that though a superficial examination of statistics indicated industrial movement, there was little actual decentralization between geographical areas but merely a migratory movement westward and southward from one geographical area which led

*Industrial Migration in the United States, by H. H. McCarty, Ph.D., published by College of Commerce, State University of Iowa, Iowa City, Iowa.

in industrial activity to another.

As a result of their studies they concluded that there was the following:

A Decline in the Importance Of	An Increase in the Importance Of
New England States - particularly Massachusetts-1.25% Middle Atlantic States - particularly Pennsylvania-.75%, and New York-.63% Entire West North Central Group-except South Dakota which had no change Entire Mountain Group - except Wyoming-.02% gain, Idaho unchanged Entire South, except North Carolina-.94% gain; Texas-.23%; Alabama-.13%; Virginia-.08%; South Carolina-.07%; Oklahoma-.06%; Tennessee-.05%; and District of Columbia-.03%, small gains. Two states which also showed a great decline were Kentucky-.45%, and Minnesota-.35%.	East North Central States - except Illinois which had .25% loss Pacific Coast States - except Washington which had .05% loss. Largest increases were attributed to: Michigan 1.89% California 1.27% North Carolina .94% Ohio .81% Indiana .25%

The following is the rate of increase or decrease within the geographical area:

Decrease	Increase
Mountain States - 29.9%	Pacific States - 30.6%
New England - 16.0%	
West North Central States - 11.7%	South Atlantic States - 12.9%
East South Central States - 10.4%	
Middle Atlantic States - 4.0%	East North Central States - 7.6%
West South Central States - 1.8%	

This analysis indicates that the trends of industrial concentration of our geographical areas have made no substantial changes in bringing about an equalization of industrial activity as the proponents of decentralization vision but has merely transferred it from one section and placed it in another.

In regard to decentralization within the geographical areas we find that there has been a general population trend away from the rural areas toward the urban centers.

Urban and Rural Population by Geographic Divisions

	1920 Urban Percentage	1930 Urban Percentage
United States	51.4	56.2
New England	79.2	77.3
Middle Atlantic	74.9	77.4
East North Central	60.8	66.4
West North Central	37.7	41.8
South Atlantic	31.0	36.1
East South Central	22.4	28.1
West South Central	29.0	36.4
Mountain	36.4	39.4
Pacific	62.4	67.5

Throughout the entire nation there has been a general movement in the direction of the city, and in the one case where there has been a definite trend in the opposite direction - namely, New England - it can be explained that this is due to a change in the basis of enumeration made by the Bureau of the Census. (This is due to the fact that 10,000 or over was considered urban in 1920, while 2500 and upwards was considered urban in 1930. This accounts for the decrease. If an adjustment is made it will be found that New England experienced practically no change.)

By dividing the population distribution according to size of city or town, we find some changes which denote the opposite trend within certain population groups, and 1940 census figures are expected to show an increased trend toward smaller communities.

Population Distribution in the United States

By Size of Community

(by percentage)

	1930	1920	1910	1900
Urban Territory	56.2	51.4	45.8	40.0
Places of 1 million or more	12.3	9.6	9.2	8.5
" " 500,000 to 1 million	4.7	5.9	3.3	2.2
" " 250,000 to 500,000	6.5	4.3	4.3	3.8
" " 100,000 to 250,000	6.1	6.2	5.3	4.3
" " 50,000 to 100,000	5.3	5.0	4.5	3.6
" " 25,000 to 50,000	5.2	4.8	4.4	3.7
" " 10,000 to 25,000	7.4	6.6	6.0	5.7
" " 5,000 to 10,000	4.8	4.7	4.6	4.2
" " 2,500 to 5,000	3.8	4.3	4.2	4.1
Rural Territory	43.8	48.6	54.2	60.0
Incorporated places 1,000 to 2,500	3.9)	8.5	8.9	8.3
" " under 1,000	3.6)			
Other Territory	36.4	40.1	45.3	51.7

Significant changes may be found in the 500,000 to 1,000,000 population cities and 10,000 to 250,000 groups, as well as those possessing 5,000 to 10,000 inhabitants.

Losses in Number of Wage Earners

In Certain Population Groups*

	No. of Workers	
25 largest cities of U.S.	326,800	12%
100,000 - 250,000 population		14%
25,000 - 100,000 "		11%
10,000 - 25,000 "		8%

Gains in Number of Wage Earners

10,000 or less population	55,204

Statistics of this nature lead one to suspect that the smaller towns are gaining in employment, but it is doubtful whether this is true. Census of manufactures figures show a decline of the

*Recent Economic Changes, Volume I, p. 212, President's Conference on Unemployment; McGraw Hill Book Co.-1929

percentage of wage earners in urban areas from 53.3% in 1929 to 51.8% in 1933 (a difference of 1.5%), but it is difficult to regard this as a gain for rural areas inasmuch as it is impossible to determine whether this figure accurately represents a gain in the number of workers or merely a relatively smaller amount of unemployment for rural areas. In any case, the figures do not represent a substantial change which can be called an important trend toward decentralization.

In Recent Economic Changes there is an analysis of two hundred and twenty-eight firms which changed location in the year 1927. (Statistics furnished by U. S. Chamber of Commerce). In this analysis the most accurate indication of decentralization can be secured by noting that thirty plants stayed in the same population group, seventy-two went to a larger community, and one hundred twenty-six went to smaller communities. The greatest net loss in the number of plants was realized by cities of over 500,000 and the greatest gains were made by communities of 200,000 or less inhabitants. If we compare this with 1930 census population data (previously mentioned) we find that these changes are somewhat comparable to the population changes except in the case of the rural territory figures.

The comparison of Recent Economic Changes with Iowa Studies in Business leads to the conclusion that there has been an insignificant amount of decentralization and that which has occurred has been principally restricted to small business. In Recent Economic Changes the study was based entirely in wage earners and size of community, while the Iowa Studies in Business took into consideration other factors; namely, the value of product manufactured. The number of wage

earners cannot be taken as an indicator of trends, because large cities contain the larger establishments which adopt technological changes as soon as they are developed. Rural factories, being smaller, cannot afford the latest machinery and must rely on less efficient methods and more workers to accomplish, relatively, the same results. The value of production in urban areas may remain constant or may increase during a period when workers are displaced.

There is reason to believe that the recent depression encouraged the establishment of smaller industrial units. The increased tendency to offset transportation costs through the establishment of branch plants is generally recognized, but the development of the rural community has remained practically unaffected by this change, as the tendency in general is toward urban locations in other geographical areas.

In summarizing our discussion of decentralization we must recognize the fact that though it has been regarded by many as a trend in this country, a large part of so-called decentralization has been migration. There are tendencies of local decentralization within geographical areas, but these cannot produce the national safety and social and economic benefits to which the proponents of this theory subscribe. We must note that regardless of the fact that government policy, communication, power facilities, and transportation have prepared the way, the relocation of industry on a decentralized basis still seems impractical with regard to movement into an undeveloped community and the trend is not as pronounced as we are sometimes led to believe.

Recent Decentralization Trends

As the center of population moves westward it can be expected that industry will follow the movement. To expect decentralization of industry first and a movement of population later is unnatural and difficult to imagine. The lure of greater profits or employment, however, has a decided affect on unemployed workers, and their willingness to change their location is evidenced by their migration toward new industrial centers of the nation.

The uniformity of wages and working conditions, developments in scientific lighting and air conditioning, inexpensive electric power, and the movement of population and markets will have both negative and positive results in industrial location. There will be more reason to locate in the section which offers the greatest economic advantages, and it is difficult to predict just how far decentralization can be expected to extend in the face of these newer developments. The gradual movement of industry into rural areas and away from urban locations can be predicted as a definite movement which will increase with the passage of time.

Encouraged by the defense efforts of both government and business, we will, within the next few months, see true examples of decentralization. Industries will be placed in inland areas in locations hundreds of miles apart, in districts where similar plants do not exist. If these new plants succeed in substantially increasing the population in their vicinity, then the gradual movement of other industries will follow the establishment of new markets.

There are a number of influences in operation which are

causing decentralization of industry in the United States. Due to increased competition and the decreased profits which have been a commoon occurrence since 1929 economic efficiency has demanded that all possible means be employed to bring about profitable operation in the face of rising unit costs and lower sales volume. Previous to the recent business depression, the United States prided itself in size and constructed enormous factories and buildings which were supposed to result in increased profits. With the decline of sales and profits, the larger units found that the operation at partial capacity resulted in higher unit costs than small plants and a complete reversal of policy was instigated and the economic advantage of smaller manufacturing units was recognized.

With the elimination of some of the barriers which prevented the decentralization of industry the trends toward relocation have become more pronounced and such locations are almost universally chosen because of the economic necessity of lowering production and distributing costs for the purpose of meeting competition.

This new trend falls into two general classifications. The first may be regarded as the natural movement of industry for the economies which may be realized, and the second is a more or less artificial movement which is sponsored by the government in the interests of national defense and the welfare of the nation as a whole. The two combined movements are rapidly increasing the rate of movement of industries and will naturally result in substantial changes in the nation's industrial and economic structure.

If we reflect upon the reasons which influenced the location

of industry one realizes that the barriers to free movement are for practical purposes rapidly becoming of minor importance. Due to the fact that the nation's territorial expansion has ceased, the stage is set for industrial decentralization. It is not to be considered as a revolution but in terms of an evolution which may take place over a considerable period of time.

The dangers in the decentralization of industry are that it tends to move from one highly congested area to another or it tends to decentralize within the immediate area in which it is located. While this movement may be desirable from an economic viewpoint, it does not seriously change the unbalanced industrial condition of the nation but merely tends to transfer it from one section to another. This may bring the desired economies from the viewpoint of management, but it does not provide a greater amount of national security nor does it affect the social well-being of the nation as a whole.

There are evidences that industry has been forced by high investments in real estate and high taxes to move into the suburban areas, but this has not substantially alleviated the condition. It has merely increased the area of congestion, and in most cases migration has been from city to city rather than from city to country.

The most important step in industrial decentralization in recent years has been that taken by the Ford Motor Company. Here we find that one of our leading industrialists has undertaken to place into practice decentralization theories and found them to be practical when integrated into his industrial empire.

The Ford organization, perhaps, is an example of the largest

industrial organization to develop decentralization as a fixed policy. As a result of the establishment of manufacturing, assembly, and service plants, it may be said that the policy is carried out locally, nationally, and internationally.

What principally concerns us in this discussion is the obvious success which Ford has had in transferring some of his manufacturing operations to small rural Michigan towns. The twenty-four decentralized plants which have been established vary in size from a plant at Waterford, Michigan, employing sixty-five men to a plant at Ypsilanti, Michigan, employing 1200 men.

There are no humanitarian or philanthropic motives in the establishment of these small plants in rural communities. Wages are paid on the same basis as the large plants; and though transportation costs are said to be higher, it has been found that pride, craftsmanship, and psychology of working in a small plant lower supervision costs and result in higher standards of workmanship.

A unique feature of these Ford plants is that during the planting and harvest seasons time is given from work to permit the employees to operate their farms. In periods of prolonged idleness the city dweller is an economic burden to the nation, while these farmer-workers have sufficient postponed work to keep them busy during periods of prolonged idleness. In any event, the small income which their farms produce keeps them in the vicinity and they are available when the plant reopens.

Ford studies have shown that the farmer-worker is of higher intelligence than the average worker. He thinks more for himself, and

any ideas which he may have do not become dwarfed by the size of the establishment. The worker's job means a great deal because there are not many jobs available in the vicinity.

A certain amount of decentralization is accomplished with the increasing practice among large firms to let out contracts for parts and accessories which are used in the assembly of the finished product. For example, thousands of automotive parts are made in New England consisting of nuts, screws, bolts, electrical equipment, instruments and precision tools for use in the large factories in Michigan. An automobile may be assembled from parts some of which were manufactured several hundred miles away. This is an example of decentralization, but the points of assembly for these parts are primarily located in Michigan, making the automotive industry localized, and there is an increased tendency among these small industries to move toward the automotive centers. As a further example of decentralization we can use the manufacture of the Boeing Bomber.* Thirty-three states furnish raw materials and two hundred thirteen major subcontractors furnish parts from a total of five hundred thirty-six subcontractors located in almost every state in the country.

Many large manufacturers, recognizing the economies to be effected through the use of subcontracts have been unconsciously creating a decentralization of their own industry, and the major plant has become principally a point of assembly. The decentralization tends to be minimized as small manufactures gradually converge closer to the

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*Factory, October 1940; Truth About Defense, p. 48.

area of assembly, and localization invariably results.

One of the principal drawbacks to subcontracting or "farming-out" has been the lack of faith which prime contractors have had in products manufactured outside of their own plants. Complicated machinery which is accepted by army or navy engineers must withstand rigorous tests and meet exacting specifications which reflect upon a manufacturer's ability and his eligibility for future contracts. Manufacturers dislike to risk their reputations on parts manufactured by small concerns, and army or navy engineering boards cannot undertake testing small parts and accepting responsibility as to their perfection.

Profiting by Britain's experience in "farming-out" small parts, increased attention is being placed upon the practice. It is felt that though high testing and inspection costs might be necessary, resulting in higher manufacturing costs, the net cost will be lower, for it will bring about the increased utilization of available equipment and a less extensive investment in new facilities which would result in over-expanded industrial facilities when the defense program ends.

The concentration of orders among a small number of companies has given added impetus to the movement of "farming-out" contracts among smaller manufacturers who can pool their facilities for subcontract work. The fact that only 511 companies have contracts in excess of $100,000.00 in the last six months of 1940 and the fact that 114 firms held 95% of the defense orders during that period is a practical indicator of the concentration of orders and the untapped facilities which

can only be utilized by a more extensive use of subcontracting.*

As a part of its survey of existing facilities, the Defense Board found that three Virginia counties possessed 365 machine tools which were not in use 90% of the time, and they estimated that 50% of the nation's machine tools were not in use. This startling investigation has started a drive to place all existing facilities at full operation and to place all new developments on a secondary basis. Simplification and standardization of all kinds of parts is an effective step toward bringing more and more machine tools into operation. A majority of these idle machines are in rural locailities, and since the trend in all armaments is simplicity, the antiquity of the tools becomes a negligible factor as they are able to satisfactorily perform simple operations with a less specialized type of labor. A complete utilization of all facilities results in the release of much skilled labor and modern equipment for the more complicated operations requiring highly developed tools and skilled craftsmanship.

An example of the extent of the decentralization which can be accomplished by a large plant was recently brought to the attention of the writer by a person taking advantage of a policy undertaken by the Lynn plant of the General Electric Company. This large company, perhaps more for reasons of economy and efficiency, has brought decentralization to the greatest extreme. In addition to subletting contracts to small machine shops throughout the area surrounding its plants, it invites individuals possessing metal-working machines to participate

*Editorial Research Reports, February 20, 1940, Volume I, p. 131.

in the defense program. Upon application, in which the individual explains his capacity and the equipment available, this plant provides a small quantity of stock or semi-finished material and has it machined to specifications. When the ability of the applicant to meet the requirements is demonstrated, small lots of merchandise are issued for processing on a piecework basis at irregular intervals.

This extension of industry to the home workshop may be said to be complete decentralization. Obviously, this procedure has its limits and is impracticable for many industries, but it has possibilities which a nation at war might find it advisable to adopt, at least in part, when it finds it advantageous to decentralize industry without making unnecessary investments in plant and equipment and migrating large quantities of labor to new areas.

Government Decentralization Plans

The unpreparedness of both government and industry for the large scale rearmament program makes it necessary to practically establish a new industry for the manufacture of armaments. Technological changes which have occurred in modern warfare and industry have made the facilities which were available in the last war woefully inadequate to meet the requirements of the present or any future emergency. A preliminary estimate of the immediate requirements of new plants necessary to achieve the required armament production has been placed at sixty establishments.* Since this expansion will ultimately involve the expenditure of millions of dollars and have a direct bearing on

*Factory Magazine, September 1940, p. 42

military efficiency and preparedness, it is not surprising to find that the locations chosen for new plant construction have been the result of intensive studies by both military and industrial leaders in the light of recent developments abroad. Besides providing the maximum security for these essential undertakings, the government has set an example for business to follow, particularly in regard to essential industries.

The government desires private enterprise to finance its own expansion as much as circumstances will permit, and as a result of this policy it has neither the authority nor the ability to dictate to private enterprise the plant locations financed with private funds. Where construction is carried on by government funds, the authority of the government in selecting sites for plant location is incontestable.

Recognizing the fact that the mass migration of essential industries is a virtual impossibility due to the time which would be consumed in moving industries and that the economic chaos which would inevitably result from such a movement would bring about severe repercussions, contracts have been awarded over as wide a geographical area as possible. The objective of the defense program is to utilize present industrial capacity to the maximum in an effort to rearm to the point where national safety can be insured with a minimum of delay. The policy of spreading contracts geographically is an attempt to partially offset the dangers of industrial concentration of the nation in case the nation were attacked and to relieve the congestion which inevitably results under concentrated conditions. Recent statistics are the most accurate indicators of industrial and government policies as they apply

to both the immediate and future phases of the rearmament program.

An analysis of primary contracts awarded discloses that Arkansas, Iowa, Kansas, Oklahoma, South Dakota, Missouri, and Oklahoma received contracts amounting to only $15.59 per capita while the national average was $73.37 per capita*. This denotes that the established manufacturing facilities located in other states are being relied upon to provide the production for the initial phases of the defense program.

In contrast to this policy we find that the Middle West has received over one half of the funds allotted for plant expansion and construction. This denotes the new policy of decentralization for defense and provides an indication of the area of future defense production.

The following table illustrates more specifically present government policies and probable future plans in regard to armament production throughout the country.

Percentages of National Production, Defense Contracts and Defense Construction According to Geographical Areas*

	Value Added By Manufacture	Value Defense Contracts	Contracts for Plant Construction
New England	9.8	14.8	5.0
Middle Atlantic	29.8	31.3	9.2
South Atlantic	9.1	13.7	12.6
North Central	37.0	18.4	56.5
South Central	6.9	3.8	8.6
Mountain & Pacific	7.6	16.6	8.1
Outside Continental United States	None	1.4	None

(Above figures are based on primary contracts awarded. They do not include subcontractors and are sometimes based on the location of the bidder's main office.)

*Editorial Research Reports, February 20, 1941, Volume 1, No.7

Studies made by the War Department disclose that the greatest plant shortage exists in those plants capable of quantity production of those items which are useless for civilian needs. It is a comparatively easy matter to divert automotive manufactures to the production of armored cars or transport vehicles, but the production of aircraft, engines, mchine guns, powder, cannon and ammunition require specialized plants, as they do not meet any civilian needs and the amount of existing facilities capable of being diverted to such production are necessarily limited.

The National Defense Board provides recommendations for private plant construction with private funds. Though the manufacturer is not denied the right to choose his own plant site, his cooperative spirit usually causes him to follow the government's recommendations whenever feasible. In cases where government funds are used for plant construction, the suggestions offered by defense authorities will be more or less obligatory, and naturally, wherever the government undertakes construction for itself or for leasing purposes it will be the sole judge as to choice of location.

Locations of Defense Contracts and Plants

In the selection of sites for its own plants, the government has set up five major areas which are located from two hundred twenty to two hundred fifty miles from the boundaries of the United States. Roughly, this area is east of the Rocky Mountains, two hundred fifty miles south of the Canadian Border, two hundred fifty miles inland from the Atlantic coast line, and two hundred fifty miles north of the

Mexican Border. The strip surrounding the area represents the minimum distance which is necessary to provide for the effective operation of the various devices for protection against air attack. The terrain within this area is said to be much more readily defended by land forces in case of invasion, and the mountains prevalent in the area are natural barriers to the efficient operation of invading land forces and limit the visibility of air attackers to a considerable degree.

This broad inland area has been alphabetically divided as follows:

Area A - to include northern Indiana, Illinois, southern Wisconsin, Minnesota, Iowa and westward;

Area B - to include Ohio, south western Pennsylvania, West Virginia, western portion of Virginia, and eastern Kentucky;

Area C - to include southern Indiana and Illinois, western Kentucky, Missouri, eastern Kansas, then westward;

Area D - to include western North Carolina, northern Georgia and Alabama, and the eastern part of Tennessee, then westward;

Area E - to include the western part of Tennessee, northern Louisiana and Texas, Oklahoma and westward.

The complete defense plan includes the construction of plants, in this area, for the manufacture of explosives, powder, ammunition loading, fuse loading, small arms, and machine guns. Some aircraft plants are located within this area, and assembly plants now under construction will bring a substantial part of the proposed production within the area. The ideal situation, which is the military strategists' dream, would provide for economic and military independence for each of the five divisions within the inland area. The objective of this desire is mainly that if one area should be severely damaged or

controlled by an enemy force, the defending armies could fall back toward the next area and be assured of a continued industrial production which would permit a resumption of offensive operations against the enemy forces.

The crucial period of rearmament is the initial period, because our concentrated industrial centers must produce in sufficient quantities to provide the necessary equipment to wage a military campaign. After the period of initial rearmament a drop in the productive capacity due to enemy activity would not be quite so serious provided the inland areas were adequately defended and they were able to continue the production of aircraft, explosives and other commodities which require the most frequent replenishment during military action.

This distribution of essential plants assures the continued production of essential materials even though one or two plants may be severely damaged or destroyed. The plan eliminates the hazardous condition which is so prevalent in our coastal areas, and the distribution of both plants and population in such sparsely settled and protected communities would be a positive incentive toward encouraging eastern decentralization of both industry and population in a period of war.

From what little information is available in regard to these new defense plants, one secures the impression that they will be of the latest design and construction in industrial plant structure and a model for industry to follow. Features which will be found among these new buildings include camouflaged roofs to represent golf courses or other natural effects. The construction of separate units (particularly in the case of explosives factories) assures continued operation

of sections of the plant in case military operations, sabotage or accidents result in damage or destruction to certain parts of the establishment.

Cool fluorescent lighting will be favored over less modern types, and the lack of windows may be one of the most startling changes in construction to be effected. Protection against bomb attack is increased through concrete steel-reinforced foundations, corrugated iron walls, layers of sand under the floors of one-story structures, and concrete bomb shields at the entrances, which are provided with steel doors. The absence of windows probably denotes the possibility that air-conditioning will be included as a part of the construction, and the general specifications will probably approach those of a huge air-raid shelter to permit continued factory operation during aerial bombardment, thus insuring maximum production with a reasonable amount of safety for the workers in the plant.

In the actual selection of plant sites within this huge area between the Alleghany and Rocky Mountains, the War Department Planning Board has issued a number of essential requirements to be followed in the general construction program. First, the earliest attention possible must be devoted to the construction of facilities for the manufacture of explosives and shells. The plants must be strategically located to enable the military forces to defend the location as easily as possible.

The geographic distribution within the area must be such as to prevent concentration, and this must be particularly followed in regard to munitions plants which besides being dangerous to themselves are equally dangerous to the industries or population located in their

vicinity.

The area or site reserved for plant construction should be free of gas, oil or water lines, mineral deposits and assigned mineral rights.

There must be ample rail transportation with at least two independent rail lines and well-constructed roads and highways capable of sustaining the traffic of the heavier trucks and military equipment.

Skilled and semi-skilled labor must be available within a fair radius of territory.

There must be sufficient electric power for potential as well as present needs.

Pure water must be available in unlimited quantities, particularly if it is needed in manufacturing operations; and water facilities for the disposal of spent acids which result in some kinds of manufacturing must also be available.

There must be a proximity of the necessary raw materials, which consist primarily of the following:

for the manufacture of smokeless powder -
cotton linters or wood pulp, nitric acid, alcohol, ether, other solvents and coal;

for shell loading -
toluol, diphenylamine, phenol or other hydrocarbons, nitric acid, sulphinic acid and fuel.

This policy in the choosing of plant sites will not be strictly adhered to because within the defense program there are opportunities for increasing some of the aims and objectives of the New Deal. The new government plants will be a means of rehabilitation of many rural areas and may be the opening wedge in an attempt to

further increase the social benefits which the government has sponsored without resulting in additional expenditures of money for farm relief. Here we find that there is an opportunity to provide industrial employment for many of the low income farm families and thus supplement or supplant the income of marginal farm lands by industrial activity.

Political pressure and favoritism can be expected to influence the selection of plant sites, because it is a part of the democratic system of government and it is natural in any program to retain or secure additional good will for future elections.

In general, the scheme can be commended as meeting the requirements of military strategy and economic desirability. The construction is planned according to military efficiency because when an expenditure is made it must not only conform to present conditions but to future possibilities, and it must be recognized that decentralized defense plants can easily be the nation's salvation. The locations chosen will be economically desirable because they tap a large labor reserve which was heretofore unavailable, unnecessary transportation will be avoided, and the concentration of industry which prevails in congested areas will be eliminated.

The defense program in these areas will serve a dual purpose. It will provide the impetus for a greater balance between industry and agriculture and will ease the economic burden of farm relief from the rest of the nation, at the same time providing necessary defense material for national security.

Of the $1,051,581,989 awarded for new plant construction and expansion (January 31, 1941) the following states were the principal

recipients:*

Indiana	$189,763,000
Iowa	122,820,000
Michigan	(nearly) 90,000,000
Ohio	84,000,000
Virginia	65,000,000
West Virginia	65,000,000
Eight others less than	5,000,000
Montana & North Dakota	No Contracts

Some of the larger plants now under construction are at the following locations:**

Charlestown, Indiana, about twelve miles from Louisville, Kentucky. This plant will cover an area of 4,500 acres, manufacture smokeless powder and be leased and operated by the E. I. DePont, Nemomo & Company. It is expected that the plant will employ an average working force of seven to eight thousand men.

Radford, Virginia, about forty-four miles from Roanoke, the Hercules Powder Company will construct at government expense an additional smokeless powder plant.

Detroit, Michigan - The Chrysler Corporation has under construction a tank factory which is being located contrary to the defense rules, as the need for speed is said to prevent the consideration of other locations. This plant will construct war tanks at a fixed price from government plans and pay $1.00 per year rental for the use of the plant. Four to five thousand men will be employed at this plant.

Denver, Colorado - Small arms plant to be operated by

*Editorial Research Reports, Volume 3, No. 7, February 20, 1941.
**Factory, August 1940.

Remington Arms Company, of Bridgeport, Connecticut.*

Milan, Tennessee - Ammunition loading plant to be operated by Proctor & Gamble Defense Corporation.

Sandusky, Ohio - TNT and DNT plant to be operated by Trojan Powder Company of Allentown, Pennsylvania.

Charlestown, Indiana-- Bag-loading plant to be operated by the Goodyear Engineering Corporation of Akron, Ohio.

West Henderson, Kentucky - Ammonia plant to be operated by the Solvay Process Company.

Childersburg, Alabama - Smokeless powder plant.

Fort Worth, Texas - Aircraft assembly plant to be operated by the Consolidated Aircraft Corporation.

Tulsa, Oklahoma - Aircraft assembly plant to be operated by Douglas Aircraft Corporation.

Kansas City, Missouri - Arms plant and bomber plant.

Dallas, Texas - Aircraft plant.

Cincinnati, Ohio - Aircraft plant.

This impressive list indicates that decentralization is the modern trend particularly in defense industries, and that the government policies are generally followed throughout the entire program in distributing new plant construction over a large inland area. Precaution is the keynote of all construction regarding location and serves as a practical indicator of what the future may hold for centralized industry.

The government's policy in plant construction to date has been to select the plant site according to the rules mentioned

previously or at least as close to the rules as practical, estimate the cost of the plant, and appropriate the funds for its construction. The firms which will lease the plant supervise its construction and take care of the necessary details. Upon the completion of the structures (which requires nine to fourteen months for airplane or motor plants, eight to eleven months for a machine gun factory, and eight to twelve months for a powder mill) the manufacturer leases the plant at one dollar per year and begins operations according to government contract but with private management in control.

The need for speed with maximum production makes a great deal of expansion of existing plants necessary though undesirable. In the financing of this type of construction, industry is expected to finance its own construction, secure loans from private sources, or to take advantage of Reconstruction Finance Corporation funds. All costs for plant additions for defense purposes may be amortized for tax purposes over a period of five years, provided construction was started after June 1940 and that the necessary certificates of necessity have been issued by the Defense Board.

To assist firms in securing funds from private sources, trial orders and "letters of intention" as well as actual contracts have been issued or awarded. This permits the borrowing firms to finance a majority of the necessary construction with 4% bank loans or private investment and at the same time relieves the government of much detail and expense in negotiating for construction facilities.

Problems Accompanying Decentralization Plans

As each new plant site is chosen and industrial construction begins, new problems face government and industry in ever-increasing proportions. Granted that a site meets all the requirements of military strategy and that there is an adequate supply of labor, transportation, and raw materials, a majority of these areas do not possess skilled labor in abundance. In fact, skilled labor is rapidly becoming an acute shortage in many of the congested areas which have normally had a surplus of this vital commodity.

Through the W.P.A., N.Y.A., trade schools and industry, a labor-training program is intensively under way to meet the new demands of industry. Apprentices are being trained on the floor of the largest plants, and the other agencies have gone so far as to place schools on a twenty-four hour basis. This program releases some of the skilled artisans from simple work so that they may devote more time to intricate problems or in training younger workers.

In spite of adequate labor reserves for many industries, bottle-necks in both labor and management are already foreseen. New plant construction will increase requirements for skilled labor and management far in excess of the existing supply. When it is recognized that good tool designers, machinists, and tool makers require several years of apprenticeship, a shortage in these vital trades cannot be readily alleviated. The employment of skilled, semi-skilled, and unskilled labor is retarded pending the design or manufacture of tools, dies and jigs, which are necessary for industrial manufacturing.

Similarly, a severe shortage in capable executives to operate new plants is prevalent and many contracts are going to the larger concerns having capable staffs which can undertake the construction and operation of these new defense plants.

The United States Unemployment service canvasses each local area every thirty days and tries to ascertain the employers' labor requirements for the next sixty days in an effort to supply the right type of labor at the right time. The service makes arrangements for migration into other areas in order that productive capacity and labor may be utilized to the greatest advantage.

A certain amount of experienced workers will necessarily have to be transferred from existing plants to train and supervise the new labor forces which are assembled to operate these new plants. It is planned to utilize the services of families of farmers now working marginal lands, and once the emergency is over it is felt that their return to the farms will not cause a great economic shock to the nation as they will have their normal means of subsistence as soon as they return to their former occupations.

The 300,000 miles of power lines erected by the Rural Electrification Administration may some day bring about a revival of the home workshop as decentralization is extended to include every town or farm. The day may come when in addition to relieving a great deal of drudgery, electricity may provide the farmer with a new duty - namely, that of tending some small machine during the long winter months, as a means of increasing the nation's productive capacity.

In a recent radio address, President Roosevelt predicted

that many of these "war industries " would be converted to peace-time production. He, therefore, insinuates that he intends to keep these plants in operation and continue the development of manufacturing in these areas after the emergency is over. This would imply that a balance between manufacturing and agriculture is to be maintained in these areas as a fixed policy.

The major part of the problem of maintaining this balance seems to be left in the hands of chemists and scientists. It is highly possible that a new decentralized industrial order is on the threshhold. Henry Ford has visualized the worker spending several months in the factory and then enjoying the sunshine and life in the country for a portion of the year. The cooperation of and the interdependence between farm and factory would be created by the introduction of surplus agricultural products as raw materials for industry. Although we may regard some of these ideas as approaching too closely to Utopian ideals for practical purposes, it will not be surprising to find a new era evolving through developments in the chemical laboratory.

The proponents of decentralization visualize the day when agriculture and industry will be combined into harmonious unison, and a major portion of agricultural surplus will be absorbed for industrial processes. Even though their visions may be far-fetched, there are indications that agriculture, in the future, will provide industry with more raw materials.

The introduction of alcohol blends in gasoline and its increased popularity may consume a large part of our grain surplus. Developments in the use of Soya beans as a base for synthetic enamels and

for the manufacture of plastics are indicators of what may be expected. Experiments in synthetic rubber, wool from milk, nylon and other synthetic domestic substitutions for commodities may eventually supplement our present manufacturing facilities and utilize our decentralized war factories for the artificial production of imported raw materials.

Our airplane factories are expected to continue the mass production principles of manufacturing, after the emergency, to supply light airplanes for private use. Small planes, though constructed with inefficient facilities, have already approached the cost of a medium-price automobile. Improvements in design have brought such craft beyond the experimental stage, and their common acceptance by the general public is assured. It is further expected that the thousands of pilots turned out by the Civil Aeronautics program and the naval and army forces will continue their interest in aviation and create a new future for aviation similar to the era which introduced the automobile. The next generation will, it is predicted, "take to the air," and steps taken by the aviation industry toward mass production, though it may not fully utilize its entire manufacturing capacity, will result in the creation of a new phase of the aviation industry which will prevent the deterioration of the facilities which this emergency forces us to build.

As new communities come into existence and decentralization becomes a reality, new developments in combination with old policies will have to be coordinated for the efficient functioning of industry and government. In the case of railroads, subsidies for lines serving defense areas may be necessary to maintain transportation service to factories which do not provide a sufficient volume of freight and

government construction and maintenance of certain lines may be necessary.

A unified national power system interconnecting both private and government lines may be desirable to insure sufficient generating capacity for "peak" loads or to provide ample power for areas whose generating facilities are temporarily disabled or destroyed by enemy activity. An innovation in flexible power generation has been recently introduced by the General Electric Company. The plan consists of constructing a quantity of shallow draft vessels with complete Diesel generating plants in their hold. These mobile generating stations would be towed to strategic positions in lakes, rivers or canals, as well as along the seacoast, and employed to provide power at a location where the need is only temporary, and the installation of complete generating facilities would be impracticable, to provide power for emergency purposes when other means are disrupted, or to supplant existing facilities where the service is insufficient.

The next few years may witness the construction of steam generating plants at the coal mine and through the systematic interconnection of power provide service over larger areas, resulting in greater possibilities for decentralized industry by the equalization of peak power loads on a nation-wide basis.

With the development of new industries and the expansion of old ones to provide an "arsenal for the democracies," adequate housing for the hordes of workers which are converging in the new, as well as the old, industrial centers creates additional problems. Entire communities have experienced a relative "boom" as blue prints and defense

plans have begun to take shape, and as economic laws operate, more of the worker's pay check goes into food and lodging as the scarcity of these essentials becomes more apparent.

In addition to the expenditure of millions of dollars for plant construction, the government has found it necessary to provide funds for defense housing. The Lanham Act has provided $150,000,000 for housing of this nature, and construction is underway to alleviate the shortage in dwellings. In centers like Rockdale, Illinois, Hartford, Connecticut, and Portsmouth, New Hampshire, rents are said to have reached the point where one half of the worker's earnings are expended for lodgings, and sleeping in automobiles and garages is said to be a common occurrence.

Wherever possible, the defense-housing construction is designed to dovetail into the regular housing program. Prefabricated housing is receiving new consideration particularly where it is felt that construction is temporary and dismantling and removal of homes to other locations will be necessary.

As a further step in remedying the housing shortage, it was planned to provide trailers for defense workers, but unless new facilities are built, army orders receiving preference may delay delivery as much as two years. If trailer companies can expand their present facilities and incorporate the mass production principles of automobile manufacture, a decided increase in the number of units manufactured can be predicted. A majority of trailer units ordered by the army are for the purpose of housing temporary workers engaged in army-post construction work which is relatively of short duration, and as

training camps are constructed army requirements will probably decrease.

The trailer would prove particularly useful for many workers, for defense industries may not be permanent and housing costs might be unnecessary expenditures. As to the convenience of movable homes, no better example can be given that the colonies of trailers which have been recently sponsored by the Department of Agriculture for migrating workers. We find that these modern caravans, consisting of up to fifty trailer units, possess adequate living accommodations for entire families and most of the conveniences which small communities possess, including a generating plant which supplies electricity for lighting, cooking, and recreational facilities. To be able to adapt our defense workers to these living conditions would be the greatest step in having a mobile labor supply than has ever been seen. Workers and their families could move from one area to another with a few hours' travel, thus placing workers in areas where they are most needed and permitting a safer and more adequate dispersal of one of the most valuable resources a nation has - its people.

With the announcement of industrial decentralization for defense, a great deal of alarm was expressed by the established manufacturing areas through their boards of trade, Chambers of Commerce, and Congressmen. A superficial examination of the defense program might lead one to suppose that radical changes were to be expected as a result of the new policies of government, but the opposite conditions were the primary aims.

A certain amount of decentralization has been possible as a result of new plant construction in rural inland areas which at present

is not designed to compete with existing industry but represents additional manufacturing facilities which are needed because of the present emergency. The awarding of contracts on a wide geographical area, though it does not result in actual decentralization, results in a tendency for plants to establish branch facilities, and it accomplishes results approximating decentralized conditions by distributing contracts on the basis of plant location in a region or area.

This policy is also effective in permitting the entire nation to participate in the prosperity which will accompany the tremendous expenditures of the next few years. It is sound economy and good politics to distribute the national income over a wide area. The tendency in awarding contracts has resulted in certain areas experiencing a greater percentage of work than others, but contracts cannot be awarded solely on a geographical basis because there are other factors which must be considered.

The concentrated areas have a greater percentage of population and skilled labor. They possess the plants and equipment for production and they are able to exert their share of political pressure to secure what they consider a just proportion of the available contracts.

Undoubtedly, certain areas will retain an aggressive spirit in order to secure the greatest volume of business, and decentralization will be fought to the bitter end as soon as it threatens the industrial supremacy of existing centers. This may be said to be the natural reaction of those whose investments or interests are jeopardized. Changing conditions can seriously affect the economic status of the dominating groups of individuals and bring financial disaster to the

communities which they represent.

Regardless of any action which organized business can assemble to counteract these new trends, the influence which can be exerted will be limited. The cooperative attitude of major industries and most recent policies of government indicate the importance in warfare of decentralization. This military necessity may also be the means of bringing about a condition which is economically desirable. The fact that certain sections of the nation may eventually pay a very high price for changes in industrial location does not trouble the proponents of decentralization to any great extent, because if the nation as whole will benefit then the suffering of a small part of that nation will be insignificant when it is weighed in relation to the results which are accomplished.

Probable Future of Established Manufacturing Areas As a Result of Decentralization

The complete collapse of established industrial areas cannot be expected to occur, for changing conditions result usually in the continued employment of a substantial part of the wage earners of a given area. It is difficult to conceive that any of our industrial cities will some day have the appearance of the "ghost towns" of the early West. An idea of the probable condition of many centers can be secured by an inspection of the empty mills of the leading Massachusetts cities. Counteracting factors may prevent wholesale decentralization or migration, but if the trend secures sufficient momentum, startling changes can easily transform possibilities into realities, and the era of decentralization may easily take its place in the annals

of history along with the Industrial Revolution and other important developments of economic significance.

In the face of comparatively recent developments in transportation, communication and power transmission, together with the policies of government, military strategy, and the economic desirability of decentralization, it is difficult to see what factors will intervene to prevent industrial relocation. The rapidity with which it will develop cannot be predicted at this time because it will be influenced by developments abroad. It can be stated, however, as a certainty that it will materialize in the near future as a distinct trend which will be substantially detrimental to the industrial development of the New England and Middle Atlantic States unless some unforeseen development occurs which will check the movements.

Basing our predictions upon existing conditions and the influences affecting them, we can expect major and far-reaching changes in the industrial structure of the United States. A complete substitution of rural areas for urban industries might be in the far distant future, but domestic and foreign developments invariably indicate that regardless of the resistance which is placed atainst industrial migration and decentralization from the established areas it is bound to occur within the space of relatively few years.

The present generation has already witnessed the gradual decline of the importance of New England as a textile, shoe, farm machinery, or hardware center. It has witnessed the industrial rise of the South and the Central and Western States, and there are

indications that this migration will become more pronounced as the movement gains momentum.

The New England and Middle Atlantic States have held their industrial supremacy solely by ingenuity and economic barriers which prevented westward migration. The decline, in importance of foreign exports, and the distance which these areas are from raw materials, and the geographical center of population, may be listed as the principal factors contributing to diminishing industrial importance. A highly skilled labor supply and an invigorating climate which induces greater expenditure of physical energy have been the dominating forces which have held industry to these areas for such a long period of time. Naturally, these attributes can be expected to still be important in preventing a total migration of industry because certain industries will still find it profitable to bear the costs of transportation, on articles which will stand such costs, in order to profit from the major attractions which the areas offer.

Uniform labor laws and large scale union activity have removed the attraction of many areas as a source of cheap labor, and with the standardization of competitive factors, location can be expected to receive more consideration as one of the means of meeting competition and reducing costs.

The nation's central areas are becoming increasingly attractive as they are in the center of the country and thus are located in a better position to serve their markets. Transportation facilities are less expensive and the proximity of raw materials bring economies which areas lacking strategic location cannot realize.

Perhaps as a result of the preceding paragraphs the reader visualizes a permanent and gloomy depression for the north eastern part of the country. Although a decline in manufacturing importance is a certainty, the complete collapse of industry in this area is inconceivable. New industries are continually being created, and the developments in old manufacturing processes are constantly creating opportunities for employment. The north eastern area possesses shipping terminals and facilities which enable it to remain as a center of commerce with European and South American markets, and a revival of foreign trade can result in utilization of efficient labor as an effective competitor for many inland areas and foreign countries in the world markets. The decline in population which this area will probably experience in the near future may, in the end, result in greater benefits. If a greater balance can be secured between agriculture and industry, and a portion of the excess or unemployed labor moves westward, conditions will tend to be more stable in this section, resulting in greater economic security particularly during periods of business recession. Decentralization does not show favoritism for any class or group, but its operation tends to equalize population and industry over a wider area in order that the average income of a greater number of people may be increased and their economic welfare may be improved.

Future Population Trends Resulting From Decentralization

The present government policy of decentralizing defense industries can be expected to have its affects on the nation's population trends. Recent figures issued by the United States Employment Service show that 900,000 skilled workers and 1,100,000 semi-skilled

workers are still unemployed at this phase in the development of the rearmament period. It can be reasonably assumed that a substantial portion of this labor is a surplus in its present location and it cannot be absorbed by industry because of a lack of facilities. With the construction of new plants or the full utilization of facilities in other areas, these workers are being absorbed at the rate of 16,000 per month in other sections or localities as skilled workers, supervisors or foremen. Assuming that these unemployed workers were not capable of a satisfactory performance in their capacities, their services can be utilized to take the places of men who are transferred to these new plants in supervisory or key positions.

The coastal areas will probably face a decline in population within the next few years, and these areas with the greatest income and population will become of secondary importance as the geographical expansion of the nation materializes. The absence of immigration and the declining birth rate will be positive checks to population increases, while the migration of individuals will result in substantial decreases. The attractiveness of the new industrial centers for the youth of the older areas is a constant magnet which draws them away from our concentrated industrial districts. A large percentage of our technical and commercial talent finds in the Central and Western areas greater opportunity for employment and advancement, resulting in a further decline in the population of the older areas.

In the event of an "Axis" victory in the present war, we may find that an additional factor may be introduced to further influence the population trends. With economic isolation for the United States

and the decline of industrial activity contributing to unemployment, many of our immigrants who have been able to save a small amount of capital will turn their faces toward other horizons which hold greater promise than their adopted land. Technological changes and the standardization of working conditions make it increasingly difficult for illiterate or poorly educted people of foreign countries to compete with the skilled native workers, and the increasing policy of eliminating alien workers from the payrolls does not benefit their status.

Immigrants, as a general rule, have been the greatest contribution to population increases as a result of influx of population and larger families. Their emigration to nations which may offer them, as individuals, greater opportunities for survival may cause a greater decline in the population of the nation. This would materially contribute to a greater decline in the population of the north eastern area, where these people have found it practical to reside. To these individuals migration is a common occurrence, and regardless of their adaptation to the environment of an adopted land, the homeland persists in attracting them back, particularly when they have accumulated a small amount of capital.

The increased importance of the Pacific States as manufacturing centers is rapidly increasing to the point where, for practical purposes, they will be self-sufficient; and the high costs of transportation incident to manufactured merchandise make this development inevitable. With the loss of many of its western markets, the decline in manufacturing activity of the East will prompt skilled labor to turn its attention to the new industrial frontiers and thus virtually

the sole remaining asset of the north eastern industrial section, namely, skilled labor, will tend to be less abundant.

The primary purpose of the inland plants was said to be a rehabilitation of the low income farmgroups. Assuming that these unemployed workers or trainees are not attracted to the new plants in sufficient quantities to result in a population trend there are other factors which will be instrumental in influencing the movement of individuals. As the operators of marginal farm lands find their family incomes increasing there will be increased tendencies to spend money for luxuries and consumer goods. Entrepreneurs who are seeking new opportunities for capital investment will be attracted to the newer areas and additional employment will be provided by many enterprises which find the localities fertile ground for expansion.

A new indicator of the increasing mobility of population and labor is the adoption of the automobile trailer as a housing unit by defense workers. A recent survey made in Business Week (December 7, 1940) shoed that Charlestown, Indiana, had six hundred worker-owned trailers and that eleven hundred additional units were on order but undeleivered. The convenience and popularity of this innovation in housing in one community of the nation serves as a suggestion of what one could expect if an analysis of all the defense sites were made throughout the country and if prompt delivery could be secured of the units which are ordered. Such a highly mobile labor supply could easily be an economic and social undesirability but it would be instrumental in stabilizing conditions on a national basis and result in the more complete utilization of labor particularly in periods of emergency.

Probable Economic and Social Effects of Decentralization

Unfortunately, a defense "boom" is more or less a temporary condition which can practically reach a standstill overnight. It can easily happen that once war production ceases, the new manufacturing facilities will not be turned to peace-time production but will be closed and kept ready for operation or under partial operation similar to government arsenals and shipyards. This would result in the displacement of thousands of workers and a drop in the farm incomes of the rehabilitated areas. The new plants, particularly the powder factories, do not represent stable industrial development and though decentralized and a part of the potential manufacturing capacity of the nation, they are not needed during normal times. This would be decentralization solely for defense and would result in displacement of the farm relief burden by temporary employment in a defense industry.

The results of decentralization and the economic effects upon population would be determined by a number of factors. If the decentralized plants are not operated after the emergency, the increased income and purchasing power of the areas in which they are located would result in a brief period of prosperity for thos areas, followed by a return to the same standards of living which were previously maintained. This would perhaps result in a great deal of discontent, because having felt the effects of a higher standard of living, a return to previous conditions is harder even though it is accompanied by the consoling resumption of farm relief.

If, on the other hand, the plants are leased to industry for peace-time production, the income of this group will continue,

other industries will migrate to those areas, and within a relatively short time population increases, and a measure of economic stability would result.

The expansion of new industrial areas can only result in the decline of the north eastern areas as manufacturing centers. This loss may be partially offset through the development of other sources of income, resulting in a comparative prosperity. It must be realized that the "peak" of development is passed and that a decline to the point which represents normal manufacturing activity can be anticipated.

Military and diplomatic developments of the next few months or years may further change the economic status of the people in the north eastern area. An involvement in war can result in the systematic destruction of important centers of commerce by sea and air attack. The possibilities of an attempted invasion by land, of this vital area, are discussed almost daily. If these threatened experiences are realized by the people of this section of the nation, a mass migration into inland areas might prove desirable, and it illogical to think that such a large nation with an abundance of sparsely occupied territory would attempt to rebuild this area to its former condition after feeling the effects of intensive military destruction.

Decentralization will have important social effects upon the people of the nation. In new areas the crowded and unsanitary conditions of our tenement districts will be eliminated, as new areas will be located in undeveloped communities and each dwelling unit can be economically provided with sufficient land for gardening and recreation.

Construction will be modern, as communities can be planned according to efficiency or beauty. It can be expected that persons living in these new surroundings will acquire a "rural" character which is symbolized by neighborliness and a pride in their community. Health, happiness, and a decrease in crime can be visualized as the eventual results of industrial change, provided the decentralization theory is strictly adhered to.

All this sounds like an economic and social revolution in an attempt to bring about ideal conditions in a capitalistic country which has only recently felt the effects of economic readjustment. The brief period of the past eight years has resulted in our witnessing startling social and economic changes which have almost been revolutionary in nature. The gradual evolution of decentralized industry, accompanied by increased tendencies in that direction as a direct result of the defense program, must not be entirely discounted by the reader. Each movement which the government has made in the past was made to curb excessive production and increase the social and economic welfare of its people. Now we find that the emergency creates the complete reversal of its policy of production, but it maintains its social gains and endeavors to dovetail its farm program, power projects, and construction policies into this new defense program which includes decentralization as one of its most important phases.

The increased domination of government over industry can be expected to materialize as a result of the most recent legislative developments. A mobile labor force or the shifting of labor to areas in which it is most needed will naturally involve the conscription of

labor in order to utilize it to the maximum advantage. This will result in regimentation, for the states cannot accept responsibility for individual workers whose migration may result in crossing the boundaries of several states within a short period of time. Besides finding himself dependent upon a central government for housing, employment, and relief, the individual will find a greater control exercised upon his personal life and freedom. A national standardization of education will have to be inaugurated to allow the children of migrating workers to continue their education without interruption regardless of the number of times a family may move.

Regardless of the spontaneous and cooperative attitude of industry in assisting the nation's defense effort, there is a lack of reciprocity in the government's attitude. There are threats of government control and operation of plants, there is a persistent refusal to change the maximum hours of the Wage and Hour Law for the defense industries, and there are indications that management and wealth may be conscripted even though conditions may not yet justify such a step. Instead of encouraging a harmonious relation between management and labor, it has widened the rift, and compulsory decisions have invariably been on the side of labor. This attitude on the part of the government may easily be a prelude to dictation to industrial management, and compulsory decentralization may some day be the fate of many vital defense industries.

Existing legislation gives the government unprecedented authority to construct, manufacture, acquire or operate practically every type of business that it considers necessary, and this broad

and far-reaching legislation seems to offer unlimited opportunities to coerce firms into locations which politicians deem advisable. War hysteria and emergencies are convenient excuses to make new inroads upon liberty and commerce and whether these are made with good intentions or bad they will ultimately bring about the desired results.

The pressure which political subdivisions of the national government are able to exert in order to protect state rights can be counted upon to bring about the repeal of any legislation which tends to remove the right of free enterprise, and it can be expected that any laws which tend to be unconstitutional will be rapidly repealed. The importance of a strong central government in times of emergency is unquestioned by the majority, and its action, even though it is designed to achieve greater efficiency, safety, or welfare, can easily have secondary or subsidiary effects which will remain after the emergency has passed and laws are repealed.

For example, if the government should force a defense industry to move its plant to a new area, it is doubtful that the plant would return to its old location if the new location were equal or superior to the old one. Similarly, if a group of skilled laborers is transferred to some western center by government decree to alleviate a shortage, if there is a reasonable amount of employment they will have no occasion to return to their former surroundings which may have little or no employment to offer.

This suggests that regardless of any temporary rules that may be forced upon labor or industry to cope with the defense emergency,

many will tend to be lasting changes if the economic situation of the country is favorable for them to assume a permanent character.

This brief digression into the probable results of industrial relocation shows the possibilities which may occur as a result of decentralization and the means which can be employed to force it according to governmental desires. It cannot be denied that compulsory decentralization would be desirable in defense industries and that management wisely refrains from resisting change when it knows that regardless of its desires or attitudes it could be forced to do what those in charge desire. The establishment of new defense industries in decentralized areas is to be commended from the viewpoint of national safety, but in the case of all other industries it can be predicted that regardless of emotional or political influences it can be expected that economics will be the determining factor in industrial decentralization in a majority of cases.

The era of big business plants seems to have passed its climax. Technological changes in industry and mechanization in agriculture have been contributing factors to surplus production and unemployment. Working hours have been reduced, the production of crops has been curtailed, but there is no relief for the present overburdened economic structure. We find that relief seems to have become a part of our economic life and obviously it cannot be regarded as sound economy to have a part of the population working and supporting the unemployed portion.

The constant reduction of available foreign markets and unfavorable trade balances further limit the possibilities of increased

exports. The industrialization of foreign nations limits our ability to compete for foreign markets, and if our standard of living is to be retained, we must find the solution of farm surplus and unemployment within the nation.

The local prosperity which is produced in areas where defense industries are now being located can produce sufficient impetus for private industry to locate in similar areas to meet expanding domestic markets. Due to the fact that the defense program can be utilized by private industry to recapture the costs of building construction within a relatively brief period, it can be readily seen that progressive business can be expected to take advantage of this movement to provide itself with new plants in strategic locations at comparatively small expense. After the plant is converted into peacetime production, the manufacturer who was in a position to visualize future conditions finds himself better able to meet competition, because of economic location, and centralized industry would lose in the competitive struggle.

The worker who locates in these new areas can easily find himself with a double security against economic conditions. The practicability of part-time farming, encouraged by short working hours, will enable him to raise a large part of his food supply, and he is better able to withstand the effects of business depression or seasons of industrial inactivity. The added income which industry brings to his home and community increases the living standards of the rural areas, and a more abundant life with a minimum of hardship and suffering results. (This presupposes that the defense program

will be the starting point for extensive decentralization to rural areas of industries which will provide permanent and stable income.)

The social gains which can be made as a result of decentralization have unlimited possibilities. Higher incomes, lower costs of commodities, and a resulting increased standard of living for more people can be the outstanding accomplishments. In addition to this, the redistribution of population will result in better living conditions, higher standards of health, and an optimistic outlook on life in place of the dejected and beaten atmosphere of many of our urban districts.

Decentralization can be expected to have affects upon the nation, industry, and agriculture. The equalization of income over a greater proportion of the country and people would be desirable from the economic standpoint, and the decline of excessive relief costs in both our farm and industrial areas would result in social benefits as well. The costs of crime, insanity and disease attributable to urban locations, though incalculable, must be tremendous.

The rising costs of government, the national debt, and taxes sometimes cause one to wonder where all this will lead. The termination of the defense program may bring additional appropriations for public works and farm relief. Unless constructive steps can be taken to reduce the severity and avoid a repetion of conditions prevalent during past depressions, the economic security of the nation can easily become endangered. There are no indications that our national debt will be reduced or that our national income will be permanently increased to permit the continuation of the unlimited borrowing which

has been practiced within the last few years. Population trends already indicate that a stability in population can be expected toward the end of the next decade, and as opportunities for foreign trade become less each year, it is obvious that an internal solution of industrial and economic problems is the only effective alternative to be found.

With the changes which this new era in industry and agriculture can be expected to bring, there are both short- and long-range effects which can be expected to become more evident as time moves on. With the reduction in local government revenues in those cities most affected by recent industrial migration and the rise of a degree of prosperity for communities in new areas, our investigation cannot be complete without attempting to forecast the effects which this business transition may have.

Within the next few years, the entire nation will experience prosperity. A rise of farm and industrial income will accompany industrial expansion. There will be a substantial decrease in unemployment and a revival of the building industry which had suffered from little activity since the nation showed signs of having reached its maximum point of expansion. Employment and higher wages have induced labor migration to both old and new areas, and a general rise in prices is having its affect on many commodities. This condition is gradually being felt throughout defense and non-defense industries, as the increased income gives more people a greater purchasing power.

Industry seems to have started where it left off at the time of cessation of business activity in 1929, and a repetition of that

same condition could easily be in store for the entire nation if decentralization does not absorb the shock of readjustment at the termination of the armament period.

For the workers in rural areas who have some income from manufacturing or those who are able to secure urban employment, the defense program can result in benefits if they are wise and plan for the future.

A large majority of the rural population own their homes, and many urbanites who had a small amount of capital have moved to the rural areas during the depression years and have escaped much of the severity of the depression by living on a smaller income than urban conditions would have permitted. A revival in business activity at this time permits many to pay off mortgages, secure additional land, purchase equipment, or set aside funds which will increase their security in periods of business recession.

A majority of those benefiting from increased income can be expected to go into new debts for luxuries and consumer goods.

Defense industries are absorbing increasing proportions of the materials which go into the production of consumer goods and a probable curtailment in production will leave the demand far in excess of the supply. This scarcity and the constantly increasing purchasing power of consumers can start a price rise which unless checked could easily result in economic disaster.

The armament program, though it increases national income, does not increase the national wealth, and certain necessary steps will have to be taken to prevent the increased purchasing power from

being diverted into an excessive purchase of consumer goods. Among the steps which the government can take to control this dangerous trend may be listed as the introduction of higher taxes, price-fixing, and the deflection of excess funds which might go into consumer goods to savings.

Regardless of which of these methods is used, the diversion of excess earnings into savings would be the most ideal means of conserving purchasing power over the armament program for use when the period of economic readjustment sets in. If consumer purchases can be postponed to that period, the shock of readjustment will be less severe as the purchases of consumer goods can be expected to keep employment from falling excessively. During this same period industrial activity will be permitted to resume its normal course without the severe recession which would occur if economic forces were allowed to operate without control.

The city dweller generally does not own his home and will pay out a larger amount of his income for rent, food, luxuries, and recreation which the rural dweller usually avoids. In the rural sections, we find an opportunity to provide security for economic repercussions, while the metropolitan areas offer opportunities for increased spending and a lack of provision for the future.

Industry during this period will indulge in expansion to meet both government demands for defense goods and the increased demands by consumers for articles which a greater purchasing power permits. Many industries in their expansion make their investment in a new area

because they do not desire to place their entire facilities in one location in the face of changing trends and conditions.

While the increased business activity will hide the apparent effects which decentralization will be certain to produce, the movement can be expected to produce its greatest changes with the decline of business activity in the closing phases of the defense program. As production tapers off and workers are released, it will be necessary for business to return to normal operations. The factor of location will be more pronounced because a surplus of skilled labor, modern tools, equipment, and modern buildings will exist throughout the entire nation. With the continued operation of labor laws and union activity, modern facilities and strategic location will be the dominant factors in the economic struggle for survival. Manufacturers possessing more than one plant can be expected to close those plants which have no economic advantage over competing locations. The expense of such decentralization will be practically negligible because the cost of the new plants has been borne by the defense program's plant-amortization provisions.

The construction of new plants is almost entirely absorbed by the defense program over a five-year period, and indirectly consists of subsidizing the relocation of industry. In speaking with small manufacturers, one gains the impression that though government contracts are desirable, they are figured so closely that the rate of profit is very small, and even if it were exhorbitant, the excess profits taxes can be counted upon to control the profit which may be acquired through this type of work. This would suggest that any firm

participating in defense contracts cannot create reserve funds to permit it to carry over the recession which is expected to follow. Manufacturers then, if they make plans for the future, realize that to reap the full benefits of the program they can construct new facilities to duplicate their present plants and thus continue to serve the demands of private consumers.

Upon the termination of defense work the old plant should have produced a higher rate of profit than defense work, thus providing reserve funds for the lean years to follow. New plants, although they have produced little profit, will have been financed almost entirely by the defense program. As they will usually be in a better location to serve their markets and operate more efficiently, they can supplement or replace old plants in other areas and we will then find that the full effects of recent decentralization can be felt.

Certain industries cannot operate efficiently as decentralized units, and a certain amount of centralization will remain in modern industry regardless of whether this centralization incorporates some of the decentralization theories or not. Furthermore, many industries will not be able to take advantage of the liberal terms of the amortization features because their contribution to national defense is negligible. These factors will consist of stabilizing influences which will permit existing areas to retain a large part of their industrial life. It can be expected that many of our large cities will continue as urban centers, but they will exist in a more modified form. Changes will tend to be more or less gradual, and as industries leave the area a part of the population can be expected to

follow them.

It can be expected that excessive population and industrial declines in certain areas will have a severe affect on property values and the costs of government. The increased migration of industry and population to new areas can easily result in hundreds of empty living accommodations and industrial sites. The decline in property values will result in severe effects upon investors and municipal governments.

The larger cities may find it necessary to curtail some of their services as decreasing property values and income reduce the available taxes which can be collected. The existing taxes will have to be borne by a smaller number of people and tax rates will rise to a point where a curtailment of municipal services will be necessary as the taxpayer's ability to pay decreases. Certain municipal services, such as education and medical expenses, decrease with population decreases, but other services remain constant. Financial troubles can be expected to prevail in many urban centers unless a new financial system can be devised which will either reduce the costs of city government or increase its income without excessively increasing the taxpayer's costs.

Many established industries are already making plans to absorb the shock of readjustment and their diversified experience in manufacturing defense articles can be advantageously employed to meet civilian peace-time needs. The Government can be expected to play its part in cushioning the changes in industry and employment by using controlling influences on the financial structure of the nation, at the same time providing for a gradual demobilization of both industry

and the military forces.

The average size of the new rural communities is difficult to predict because many factors may be involved in the determination of the most appropriate population. Previous figures quoted show that the towns of 10,000 or less population seemed to have less fluctuation during business depressions, and it might be regarded as the maximum amount of population desired in the community. In Kingsport, Tennessee, a rural and industrial community, the maximum population desired, according to the town's civic leaders, is placed at 30,000* inhabitants.

If excessive population and industrial location is permitted in these smaller communities, they can very easily approach the point where they become urban and the advantages of decentralization begin to disappear. After a certain size the law of diminishing returns becomes applicable to cities as well as to business or agriculture, and the costs of government increase in greater proportion to the number of inhabitants and the services rendered. Thus, the ultimate size must be controlled. To allow the expansion of towns beyond the point of economic desirability would minimize the benefits which can be secured, and we would return to the point where we started.

As rural areas become more important as industrial centers, their economic stability will make them more desirable than urban locations. A greater number of people will be attracted to them. This may cause serious declines in investments and real estate in many

*America Reborn, Ralph M. Woods, p. 293, Longmans Green & Co., 1930

urban localities, but they will be offset by gains in other directions. It can be expected that a relative decline in the importance of the industrial north east area and the transfer of many industries from urban to rural communities will be expensive for someone, but if the national economy and welfare is improved and gains are made in other sections, there will be a balance of losses and gains in the nation as a whole.

The urban areas are constantly facing losses as values decline in certain communities and investments make gains in other areas. Decentralization would cause the same effects on a wider basis but once the change has been made, its values would remain fairly constant, and the resulting stability of conditions would be much more desirable for the community and the investor. The greatest losses would fall on those who try to resist the change and who are not far-sighted enough to visualize changing trends and conditions. A small immediate loss is sometimes preferable to a later total loss, but many people are optimistic and, as a result, their losses are greater than one who has the opposite point of view and anticipates the worst.

All this forecasts a change in life and customs for a nation which has always prided itself in enormous ventures whether they were translated in terms of money, buildings, cities or charity. Big business and mass production seemed to be the solution of economic problems and the ways to a better life. Regardless of any shortcomings of our ideas in that direction they have been a contribution to our way of life and national existence. The financial crash of 1929 demonstrated that size was not the only universal element to be

considered in the industrial system. Over-expansion and diminishing returns brought industry to its senses by their severe effects in the years that followed, and though size was recognized as a determining factor in operating efficiency for many industries, it was no longer regarded as the ultimate goal for every firm.

Present indications are that America is eventually destined to become a nation of small communities instead of a vast area dominated by large cities and industrial concentration. Large business will have its importance in the new order, but branch plants and small business can be expected to flourish in rural areas. New developments in science and chemistry can be expected to blend both agriculture and industry, and the internal development of the country will bring about a stabilized condition which is only slightly distrubed by economic changes. The diversification of rural industries will be a contributing factor to a nominal prosperity, and savings through the full utilization of by-products, elimination of unnecessary transportation, and the economies to be derived from a rural location can easily be the means of providing more people with the necessities and luxuries of life at a lower cost. There will be a standardization of opportunities and culture as urban and rural populations intermingle, and the happiness and well-being of the majority will supplant the superiority and well-being of the few.

The natural operation of decentralization does not envisage socialism or communism, and it will not encourage these tendencies unless the government assures greater dictatorial powers and forces change in a more direct manner. The small community, once it attains

the desired degree of balance between industry and agriculture, would permit a much more complete operation of the democratic principles of government. It would encourage the restoration of individualism and result in the release from economic slavery of thousands of individuals who have become subject to both industry and government to a startling degree. Communism, socialism, and fascism could never compete with democracy in a nation rich in economic resources and where greater opportunities would exist for each man who could believe those sacred words that "all men are created equal."

In the presentation of this data on decentralization, we have tried to show the present status of industrial location and the influences and factors which had a bearing upon the centralization of industry. The difficulties which a lack of decentralization brings in regard to defense have been enumerated, and the common methods which can be employed to defend our population and productive facilities have been demonstrated. As a result of these important revelations, it can be concluded that decentralization is desirable, and an attempt has been made to show that the importance of economic barriers as deterring factors to decentralized industry, particularly in the light of recent developments, have decreased.

Decentralization was placed into two major classifications, and the extent of natural industrial decentralization and the artificial inducements which are in operation to produce relocation for national security have been shown. The recent developments which will increase industrial changes and the possible affects which these

changes may have on the people and nation as a whole have been the final steps in the consideration of the subject which has become of paramount importance, particularly in our own geographical area, which seems destined to feel its adverse affects the most.

Economic functions may be said to operate in cycles, and regardless of any artificial forces which are used to control or influence their operation, they invariably make their operation felt. In addition to these reactions, it must be recognized that change is a constant and dynamic force which is constantly operating to prevent the stagnation and degeneration of society. Decentralization has achieved greater interest and prominence in the past decade and it may easily be another phase in the economic development of the nation which can prove beneficial in many respects as time goes on.

Many foresee the end of democracy and the stabilization of the nation on its present basis. They are resigned to the fact that the machine has released men from industry and agriculture and that unemployment and poverty are permanent additions to our economic system. The feeling is prevalent that the age of opportunity has passed and men must resign themselves to be either slaves or paupers of society and helpless pawns in a war-mad world which clamors for more machines for construction and still more for destruction. It seems that life is destined to be a struggle between men, communities, and nations with poverty for the masses and wealth for only a few.

The increasing span of life and industry's reluctance to hire older men is an additional reason for men's dejected outlook on life. If decentralized industry can influence workers to purchase

small farms during their period of maximum earnings, they will have a greater degree of security in their old age as they will have a means of subsistence if employers refuse to avail themselves of their services. In combination with social security payments, workers too old to engage in active work would be in a better position to enjoy their old age when they are established in their own home and in a small community possessing a friendly spirit.

Only an important economic change in the structure of the nation as accomplished through industrial relocation can dismiss the attitude that "the world owes us a living" from the minds of the coming generations. Conditions are favorable, a change is necessary for both national and economic security, the defense program provides the means, and whether it is wanted or not, more extensive decentralization is on the way.

America can look forward with a new hope in relocation as a means of strengthening the nation against military conquest, increasing the opportunities for a more abundant life for the majority of the people, and promoting health and happiness through neutralizing and eliminating a majority of the undesirable economic and social forces which exist in many of our urban centers.

APPENDIX A

Type of Materials Required By Each Purchasing Branch of United States Army

1. Quartermaster Corps. Office supplies, solid fuels, lubricants, liquid fuels, paints, cotton, cotton goods, silk, silk goods, wool, woolen goods, leather, leather goods, machinery, hand tools, vehicles, asbestos, electrical apparatus, hemp and hemp goods, jute and jute goods, linen and linen goods, paper and paper articles, rubber and rubber goods, skins and products manufactured from skins, wood and wooden products, forage and straw, livestock, dyestuffs, camp and mess equipment, hardware, brushes and brooms, musical instruments, furniture, fur and fur goods, printing equipment and supplies and accessories peculiar thereto, shipping equipment and materials peculiar to the construction and repair of shipping equipment, docking, loading and unloading equipment, laundry plants, salvage plants, buildings, builders' equipment and supplies, lumber, plumbing equipment and supplies, power, lighting and heating plants, fire preventing and fire fighting equipment, refrigerating plants, water supply plants, internal combustion motors, vehicles and motors and motor-drawn chassis and bodies, parts and accessories, harnesses.

2. Medical Department. General chemicals, medical, surgical, hospital supplies, etc.

3. Ordnance Department. Parts, materials and accessories for ammunition and explosives, parts and accessorites for artillery, automatic arms, equipment and supplies peculiar to forge shops, equipment and supplies peculiar to foundries, measuring instruments, equipment and supplies peculiar to machine shops, ferrous and non-ferrous metals, optical instruments, pyrotechnics, tractors, tanks, motor-driven combat vehicles, etc.

4. Corps of Engineers. Drafting equipment, equipment and supplies peculiar to the construction of fortifications, equipment and supplies peculiar to lumbering, equipment and supplies peculiar to maps, equipment and supplies peculiar to the construction of railroads, equipment and supplies peculiar to the construction of roads, searchlights, equipment and supplies peculiar to field bridges, cable and wire, demolition and miscellaneous equipment, etc.

5. Signal Corps. Equipment and supplies peculiar to sound ranging, central office and outside plant equipment, installation of telephone systems, radio station equipment and installation, batteries, parts and accessories including charging sets, electrical communication equipment, non-electrical communication equipment, electrical instruments, meteorological instruments, photographic instruments, cinematographic equipment.

6. Chemical Warfare. Service equipment and supplies peculiar to defensive and offensive gas warfare, etc.

7. Air Corps. Aircraft and accessories.

From: M Day, By Leo M. Cherne
Part II M-Day and the Businessman, Page 63, Simon T. Schuster, New York 1940.

APPENDIX B

CLASSIFICATION OF ESSENTIAL DEFENSE INDUSTRIES

(Derived from priority circulars used during the first World War)

Ratings Defined in First World War - Priority Commodities Board

Class AA included only emergency war work of an exceptional and urgent nature.

Class A included all other war work, such as the manufacture of arms, ammunition, destroyers, submarines, battleships, transports, merchant ships, airplanes, locomotives, military trucks, and the like.

Class B included all orders and work which, while not primarily designed to help the prosecution of the war, were essential to national welfare, minimum civilian needs, or possessed exceptional importance for some other reason.

Class C included activity which, while not itself covered by the priority certificates issued in the first three groups, was to be utilized to assist or further any one of the activities or functions requiring preferential treatment.

Class D included all other orders and work.

From: M Day, By Leo M. Cherne
Part II M-Day and the Businessman, Page 63, Simon T. Schuster, New York, 1940.

APPENDIX C

LIST OF ESSENTIAL WAR INDUSTRIES

Aircraft - Plants engaged principally* in manufacturing aircraft, air-supplies and equipment - I**

Ammunition - Plants engaged principally in manufacturing same for the United States Government and the Allies - I

Army and Navy - Arsenals and navy yards - I

Army and Navy - Cantonments and camps - I

Arms (small) - Plants engaged principally in manufacturing same for the United States Government and the Allies - I

Bags - Hemp, Jute and Cotton Plants engaged in manufacturing same - IV

Blast Furnaces - Producing Pig Iron - I

Boots and Shoes - Plants engaged exclusively in manufacturing same - IV

Brass and Copper - Plants engaged principally in rolling and drawing copper, brass, and other copper alloys in the form of sheets, rods, wire and tubes - II

Chain - Plants engaged principally in manufacturing iron and steel chain - III

Chemicals - Plants engaged principally in manufacturing chemicals for the production of military and naval explosives, ammunition and aircraft, and use in chemical warfare - I

Chemicals - Plants, not otherwise classified and listed, engaged principally in manufacturing chemicals - IV

Coke - Plants engaged principally in producing metallurgical coke and by-products including toluol - I

*The word "principally" means 75% of the total plant production.
**Class I industries are those of exceptional importance in connection with the prosecution of war.

Cotton - Plants engaged in the compression of cotton - IV

Cranes - Plants engaged principally in manufacturing locomotive cranes - II

Cranes - Plants engaged principally in manufacturing travelling cranes - III

Domestic Consumers - Fuel and electric energy for residential consumption, including homes, apartment houses, residential flats, restaurants, hotels - I

Domestic Consumers - Fuel and electric energy not otherwise specifically listed - III

Drugs - Medicines and medical and surgical supplies - Plants engaged principally in manufacturing same - IV

Electrical Equipment - Plants engaged principally in manufacturing same - III

Explosives - Plants engaged principally in manufacturing same for military and naval purposes for the United States Government and the Allies - I

Explosives - Plants, plants not otherwise classified or listed, engaged principally in manufacturing same and not otherwise listed - III

Farm Implements - Plants engaged principally in manufacturing agricultural and farm-operating equipment - IV

Feed - Plants engaged principally in preparing or manufacturing feed for livestock and poultry - I

Ferro Alloys - Plants engaged principally in producing ferrochrome, ferro manganese, ferromolybdenum, ferrosilicon, ferrotungsten, ferrouranium, ferrovanadium, ferrozeconium - II

Fertilizers - Plants engaged principally in producing same - IV

Fire Brick - Plants engaged principally in manufacturing same - IV

Foods - Plants engaged principally in producing, milling, refining, preserving, refrigerating, wholesaling or storing food for human consumption, embraced with the following description: All cereals and cereal products, meats including poultry, fish, vegetables, fruit, sugar, syrups, glucose, butter, eggs, cheese, milk and cream, lards, lard compounds, oleomargarine and other substitutes for butter or lard, vegetable oils, beans, salt, coffee, baking powder, soda and yeast, ammonia for refrigeration - I

Foods - Plants engaged principally in producing, milling, preparing refining, preserving, refrigerating, or storing food for human consumption not otherwise specifically listed (excepting herefrom plants producing confectionery, soft drinks and chewing gum) - III

Food Containers - Plants engaged principally in manufacturing same - IV

Foundries (Iron) - Plants engaged principally in the manufacture of gray iron and malleable iron castings - IV

Guns (large) - Plants engaged principally in manufacturing same for the United States Government and the Allies - I

Ice - Plants engaged in principally manufacturing same - III

Insecticides and Fungicides - Plants principally engaged in manufacturing same - IV

Laundries - IV

Machine Tools - Plants engaged principally in manufacturing same - II

Mines - Coal - I

Mines - Producing metals and ferro alloy minerals - II

Mines - Plants engaged principally in manufacturing mining tools and equipment - III

Newspapers and Periodicals - Plants engaged principally in printing newspapers or periodicals which are entered at the post-office as 2nd-class mail matter - IV

Oil and Gas - Plants engaged principally in producing oil or natural gas for fuel or for mechanical purposes, including refining or manufacturing oil for fuel or for mechanical purposes - I

Oil and Gas - Pipe lines and pumping stations engaged in transporting oil or natural gas - I

Oil and Gas - Plants engaged principally in manufacturing equipment or supplies for producing oil or natural gas, or for refining or manufacturing oil for fuel or mechanical purposes - III

Public Institutions and Buildings (maintenance and operation of) used as hotels or sanitariums - I

Public Institutions and Buildings (maintenance and operation of) other than hospitals and sanitariums - III

Public Utilities - Gas plants producing tuluol - I

Public Utilities - Street railways, electric lighting and power companies, gas plants not otherwise classified, telephone and telegraph companies, water supply companies, and like general utilities - II

Public Utilities - Plants engaged principally in manufacturing equipment for railways or other public utilities - II

Pulp and Paper - Plants exclusively used in manufacturing same - IV

Railways - Operated by U.S. Railroad Administration - I

Railways - Not operated by U.S. Railroad Administration (excluding those operated as plant facilities - II

Ships - (maintenance and operation of) - excluding pleasure craft not common carriers - I

Ships - Plants engaged principally in building ships, excluding (a) pleasure craft not common carriers, (b) ships not built for the U. S. government or the Allies or under license from U. S. Shipping Board - I

Soap - Plants engaged principally in manufacturing same - IV

Steelmaking Furnaces - Plants engaged solely in manufacturing ingots and steel castings by the open-hearth, Bessemer, crucible, or electric-furnace process, including blooming mills, bullet mills, and slabbing mills for same - I

Steel-Plate Mills - I

Steel-Rail Mills - Rolling rails 50 or more pounds per yard - I

Steel - All plants operating steel-rolling and drawing mills exclusive of those taking higher classification - III

Tanners - Plants engaged principally in tanning leather - IV

Tanning - Plants engaged principally in manufacturing tanning extracts - IV

Textiles - Plants engaged principally in manufacturing cotton textiles, including spinning, weaving, and finishing - IV

Textiles - Plants engaged principally in manufacturing woolen textiles, including spinners, top makers, and weavers - IV

Textiles - Plants engaged principally in manufacturing cotton or woolen-knit goods - IV

Textiles - Plants engaged principally in manufacturing textile machinery - IV

Tin Plates - Plants engaged principally in manufacturing same - III

Tobacco — Only for preserving, drying, curing, packing, and storing same not for manufacturing and marketing - IV

Tools - Plants engaged principally in manufacturing small or hand tools for working wood or metal - III

Twine (binder) and Rope - Plants engaged principally in manufacturing same - IV

War and Navy Departments - Construction work conducted by either the War Department or the Navy Department of the United States in embarkation ports, harbors, fortified places, flood-protection operations, docks, channels, inland waterways, and in the maintenance and repair of same - II

Wire and Rope and Rope Wire - Plants engaged principally in manufacturing same - II

From: M Day, by Leo M. Cherne, Part II M-Day and the Businessman, pages 66, 67, 68, 69; Simon T. Schuster, New York 1940.

APPENDIX D

GEOGRAPHICAL DIVISIONS

Used by the U. S. Bureau of the Census for Statistical Purposes

EAST OF THE MISSISSIPPI

New England

Maine
New Hampshire
Vermont
Massachusetts
Rhode Island
Connecticut

Middle Atlantic

New Jersey
New York
Pennsylvania

East North Central

Ohio
Indiana
Illinois
Michigan
Wisconsin

South Atlantic

Delaware
Maryland
District of Columbia
Georgia
Virginia
West Virginia
North Carolina
South Carolina
Florida

East South Central

Kentucky
Tennessee
Alabama
Mississippi

WEST OF THE MISSISSIPPI

West North Central

Minnesota
Iowa
Missouri
North Dakota
South Dakota
Nebraska
Kansas

West South Central

Louisiana
Oklahoma
Texas

Mountain

Montana
Idaho
Wyoming
Colorado
New Mexico
Arizona
Utah
Nevada

Pacific

Washington
Oregon
California

APPENDIX E

GEOGRAPHICAL DISTRIBUTION OF WAGE JOBS IN SPECIFIED INDUSTRIES - 1929

(figures are percentages of U.S. total for each industrial group)

Industry	Geographical Divisions								
	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
Electrical machinery, apparatus & supplies	14.2	40.6	39.6	3.0	0.4	0.5	0.1	0.1	1.4
Motor Vehicles, bodies and parts	1.5	13.0	75.6	3.4	1.3	1.9	1.1	0.2	2.0
Clothing, all branches	5.6	54.6	17.8	5.7	8.0	2.3	2.1	0.3	3.5
Furniture, all kinds	6.3	20.7	42.8	4.0	14.3	3.6	2.1	0.2	6.0
Printing & Publishing	8.6	30.2	29.4	9.6	6.8	3.0	4.1	1.9	6.4
Knit Goods	7.1	48.2	13.5	1.5	17.2	10.6	0.4	0.2	1.3
Chemicals, including rayon and allied products, and compressed and liquefied gases	5.0	41.2	16.7	1.4	23.0	9.3	0.8	0.3	2.4
Petroleum Refining	1.6	22.6	14.7	4.6	2.6	0.7	40.0	3.0	10.1
Lumber & Timber	2.2	1.5	7.8	2.2	19.9	17.1	19.1	3.2	19.4
Canning and Preserving	1.9	16.4	20.0	5.3	12.0	2.3	2.6	3.1	36.4
Bread & Bakery Products	8.3	32.3	24.7	10.0	6.9	2.9	5.1	1.9	7.8
Engines & Turbines	3.1	17.6	66.2	8.1	0.1	...	0.1	...	4.8
Meat Packing	2.7	12.5	37.2	31.4	3.4	1.5	4.5	2.1	4.7
Cigars & Cigarettes	2.9	41.4	14.2	1.2	33.1	4.0	1.7	0.2	1.3
Leather	23.1	36.8	22.7	1.0	13.5	1.8	...	...	1.1
Woolens & Worsteds	67.3	22.1	3.8	0.5	3.3	1.6	0.1	0.1	1.2
Iron & Steel Works	1.1	43.5	40.2	1.6	6.7	3.8	0.1	1.0	1.9
Hardware	36.6	17.9	41.5	1.9	0.2	0.9	0.1	...	0.9
Silk & Rayon Mfg.	19.8	71.5	2.4	...	5.6	0.6	...	...	0.1
Boots & Shoes	38.9	23.7	19.5	12.9	2.3	2.2	0.1	...	0.4
Cotton Goods	29.9	44.3	0.7	0.1	53.9	9.1	1.7	...	0.3
Glass	0.7	38.3	33.1	2.7	19.0	0.6	3.3	....	2.3

*America Reborn, Ralph L. Woods; Longmans, Green & Co., p. 347

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